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THE DISTRIBUTION OF FISHES FOUND
BELOW A DEPTH OF 2000 METERS

MARION GREY

FIELDIANA: ZOOLOGY

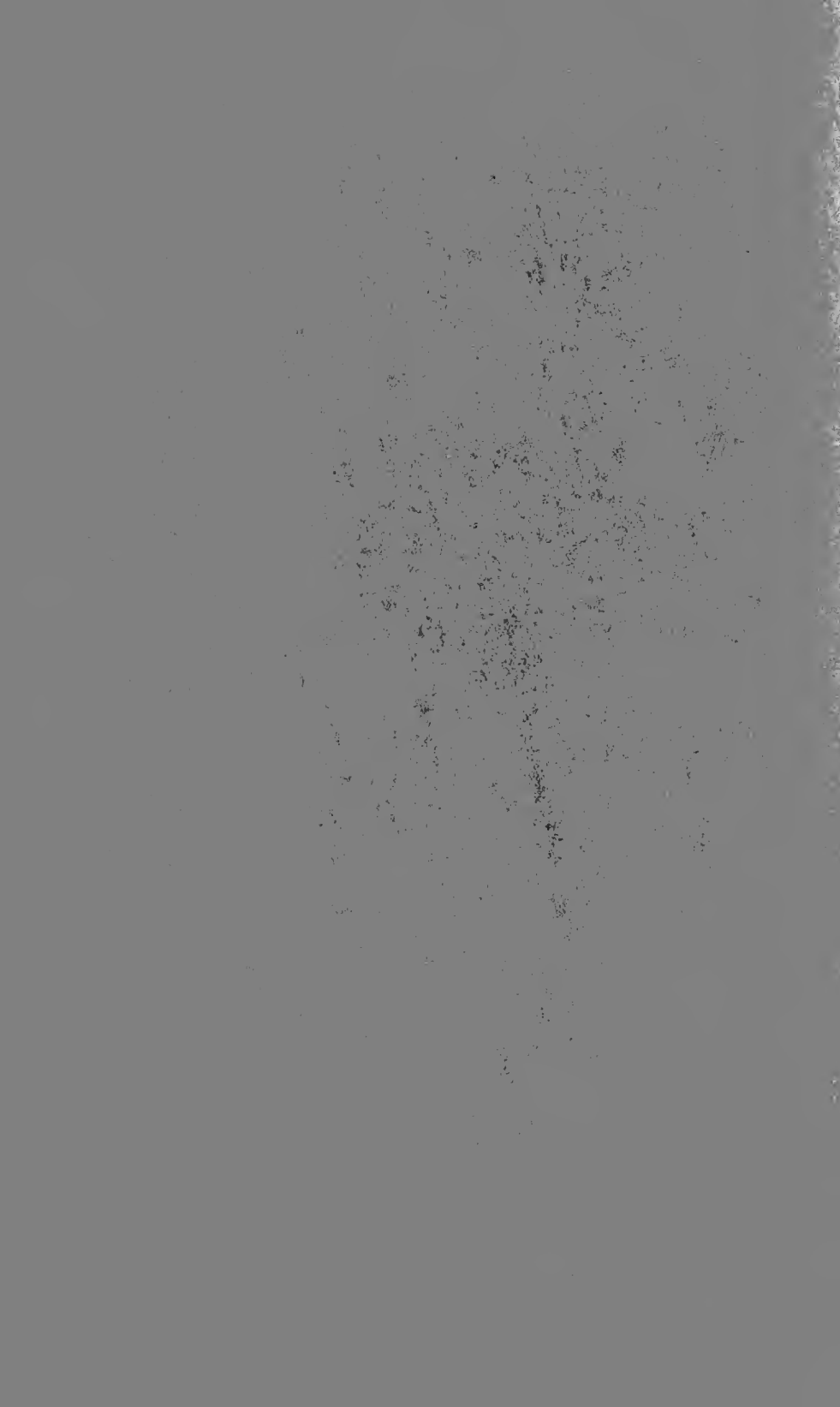
VOLUME 36, NUMBER 2

Published by

CHICAGO NATURAL HISTORY MUSEUM

JULY 30, 1956

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THE DISTRIBUTION OF FISHES FOUND
BELOW A DEPTH OF 2000 METERS

MARION GREY

Associate, Division of Fishes

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UNIVERSITY OF ILLINOIS

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The Distribution of Fishes Found Below a Depth of 2000 Meters

INTRODUCTION

In *The Depths of the Ocean* (Murray and Hjort, 1912, p. 414) Dr. Johan Hjort published a list of fishes believed to live upon the ocean floor at depths exceeding 2000 fathoms (3660 meters). The list contained twenty-one species belonging to six families, with only thirty-five individuals known.

A check of Hjort's list in the light of subsequent knowledge reveals that two of the species, *Bathypterois longicauda* Günther and *Macrurus gigas* Vaillant, have been reduced to synonymy, and that one, *Histiobranchus infernalis* Gill, was erroneously included and has never actually been reported from waters below 3660 meters. *Aleposomus copei* Gill is undoubtedly a bathypelagic fish, with its center of distribution well above the 2000-meter line. Thus, of the species listed by Hjort, only seventeen that can with any degree of certainty be referred to as benthic fishes are found below a depth of 3660 meters.

A survey of the literature published since 1912 adds to Hjort's list twenty-one species that probably live on bottom, thus raising the present total to a possible thirty-eight species, divided among eleven families and thirty genera, and represented by about 120 specimens actually caught below 3660 meters. The increase is small, but the technical difficulties and costliness of fishing at such great depths have not lessened in the intervening years and little such work has been carried out, especially in comparison with the large amount of fishing accomplished at higher levels in the deep sea. There are still some unidentified collections made by the United States Fisheries Steamer *Albatross* in Pacific waters, as well as recent collections made by Swedish, Russian, and Danish oceanographic expeditions. Dr. A. F. Bruun has written (1952, in litt.) that the results of the *Galathea* Expedition (1950-52) will alter some of the findings noted in this paper, extending the ranges of

some of the species listed here and adding new species to the list. The Danish expedition concentrated on abyssal benthic trawling in many different parts of the world, returning with a large collection of fishes and invertebrates.

Although the *Galathea* results and other reports will add greatly to our knowledge, much further research will be necessary before we can attain a clear or complete picture of life at these great depths. Research on deep-sea life is still in its infancy. New forms are found so frequently that more obviously remain to be discovered, and it will be many years before enough benthic material has been gathered from deep-abyssal waters to allow detailed distributional studies.

TERMINOLOGY

The terms *archibenthic* (between 200–400 and about 1000 meters) and *abyssal* (below 1000 meters) are used here as defined by Ekman (1935, 1953). The name *deep-abyssal* has been added to denote those areas of the sea lying below a depth of about 2000 meters. Nybelin (1953) has proposed the term *eu-abyssal* for the fauna found below about 4000 meters.

Hjort defined the *abyssal plain* as those areas of the ocean floor below a depth of 2000 fathoms (3660 meters), the regions between 1500 and 2000 fathoms being, for fishes, a transition zone between the plain and the continental slope. It seems useful to include among the deepest-living fishes those found below a depth of 2000 meters, and this deep-abyssal fauna is treated in the following discussion. Species ranging to 1000 fathoms (1829 meters) are included, since the 1000-fathom line has been used as often as the 2000-meter line to divide deep-sea zones. These divisions are arbitrary in any case. It is known that the vertical boundaries of deep-sea zones vary considerably in different areas but inadequate knowledge of the fauna prevents a precise definition of these zones.

FISHES FOUND BELOW 3660 METERS

Hjort pointed out that benthic species recorded from the abyssal plain, and also known from more than one catch, have wide ranges both vertically and horizontally. Thus, *Nematonurus armatus* has an extreme vertical range of 282 to 4700 meters. Its geographical distribution is also wide, specimens having been reported from both sides of the Atlantic, in the central and southern parts of the Pacific, and in the southern Indian Ocean. Similar examples will be found in the discussion of individual species, but there are also species

known from several hauls of which none were above the deep-abyssal zone (*Bathysaurus mollis*, *Synaphobranchus bathybius*, *Lionurus flicauda* and others). *Bathymicrops regis*, *Bassozetus taenia* and *Grimaldichthys profundissimus* have been caught several times each, and only on the abyssal plain. These three species have been taken only in the north Atlantic and are not, as yet, known to have a wide

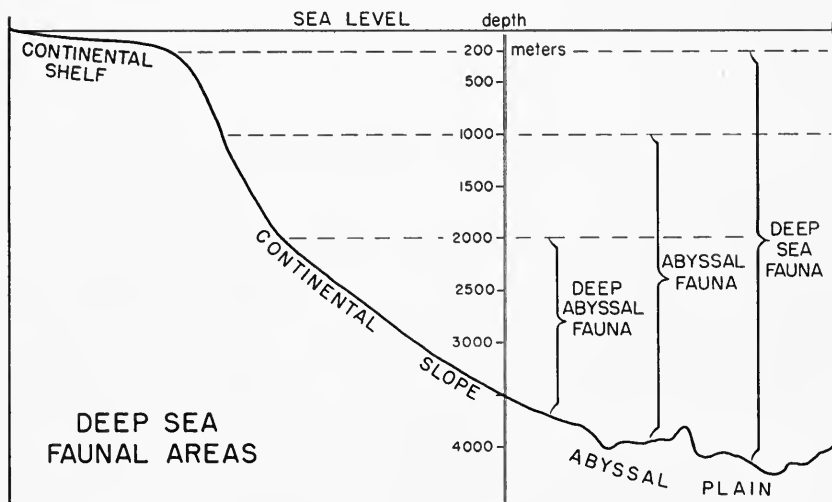


FIG. 4. Deep sea faunal areas.

horizontal range. At the present time any attempt to outline patterns of fish-distribution on the abyssal plain would be open to question.

Of the fishes whose vertical range includes the abyssal plain below 3660 meters, nineteen of the species listed below (names preceded by an asterisk) are known from only one, two, or three specimens each. They may actually be relatively common at such depths but further captures will be necessary before that fact can be established. Of the remaining species on the list, only *Bathysaurus mollis*, *Bathymicrops regis*, *Nematonurus armatus*, and perhaps *Bassozetus taenia* and *Grimaldichthys profundissimus*, show evidence of being more than accidental on the abyssal plain.

Family ALEPOCEPHALIDAE

Alepocephalus rostratus Risso¹

**Rinoctes nasutus* Koefoed

**Bathytroctes macrolepis* Günther

Rouleina attritus Vaillant¹

**Ericara salmonea* Gill and Townsend

¹ Deepest record 3655 meters. Listed by Murray and Hjort (1912) but probably not reaching the abyssal plain.

Family BATHYLACONIDAE

**Bathylaco nigricans* Goode and Bean

Family HARPADONTIDAE

Bathysaurus mollis Günther

Family BATHYPTEROIDAE

Bathypterois longipes Günther

Family IPNOPIDAE

Bathymicrops regis Hjort and Koefoed *Ipnoops murrayi* Günther**Bathymicrops sewelli* Norman

Family SYNAPHOBRANCHIDAE

**Synaphobranchus bathybius* Günther

Family HALOSAURIDAE

**Aldrovandia rostrata* Günther

Family MACROURIDAE

Nematonurus abyssorum* Gilbert*Nematonurus armatus* HectorChalinura liocephala* Günther*Chalinura simula* Goode and Bean*Chalinura carapina* Goode and Bean*Chalinura brevibarbis* Goode and Bean*Lionurus filicauda* Günther*Nezumia sclerorhynchus* Valenciennes¹*Cetonurus globiceps* Vaillant**Echinomacrus mollis* Roule

Family STEPHANOBERYCIDAE

Acanthochaenus luetkeni Gill**Malacosarcus macrostoma* Günther

Family ZOARCIDAE

Lycenchelys albus* VaillantPachycara obesa* Zugmayer

Family BROTULIDAE

Barathrites abyssorum* Roule*Bassogigas crassus* Vaillant*Bassogigas digittatus* GarmanBassogigas brucei* Dollo**Alcockia rostrata* Günther*Bassozetus taenia* Günther*Mixonus laticeps* Günther*Grimaldichthys profundissimus* Roule**Grimaldichthys squamosus* Roule**Typhlonus nasus* Günther**Leucochlamys cryptophthalmus* Zugmayer

The following species have not been included in the above list because in each case the one record from below 3660 meters must be ignored in the face of overwhelming evidence that the species are well known at much higher levels: *Hymenocephalus italicus* Giglioli,

¹ See footnote, page 79.

discussed below with the fauna found below 2000 meters; *Dicrolene introniger* Goode and Bean, a species of shallower water, of which one damaged specimen has been reported from 5000 meters (Koefoed, 1927, p. 134); and *Ventrifossa petersoni* Alcock, a common archibenthic macrourid of the Indo-Pacific region, of which a damaged specimen, probably misidentified, was once reported from 4391 meters (Weber, 1913, p. 156).

Of the eleven families reported from the ocean floor below 3660 meters, macrourids and brotulids together make up slightly more than half of the species, while macrourids predominate in the number of individuals caught (about forty). However small the numbers seem, it is to be remembered, as Hjort wrote in 1912, that evidence of the scarcity of fishes on the abyssal plain is negative. The number of dredging operations carried on at and below that depth is infinitely less than those executed at higher levels; and the vastness of the area in question is a barrier to an increase in our knowledge and will doubtless continue to be so for many years.

It seems logical to conclude that on the whole life is less concentrated at great depths than elsewhere in the sea (see Murray and Hjort, 1912, p. 419; Krogh, 1934, p. 430; and Marshall, 1954, p. 336), but the deep sea floor may not be as barren as has sometimes been imagined. Knowledge of bottom life will probably be increased through evidence accumulated by use of submarine cameras, underwater television, or even by actual observation. During the only trip ever made to the abyssal plain, sea anemones, numerous "animal holes" and a six-foot shark were observed on bottom at more than 4000 meters, in the Atlantic off Dakar, West Africa (Houot, 1954, p. 83). On the bottom at a depth of 2347 meters in the Mediterranean, MacLeish (1954, p. 88) reported seeing starfish, sea anemones, many burrows, each with several paths extending from it, and two fishes "supported several inches above the bottom by slender spines extending from their tails and fins. They too were immobile."¹

The greatest depth from which any fish is known was recently recorded by a Russian expedition, which captured a new species of the family Liparidae in the northern Pacific at 7200 meters

¹ The photograph and drawing published by MacLeish suggested that these fishes were *Benthosaurus* and a later and clearer photograph taken in the same area at a depth of 2132 meters (Edgerton, 1955, p. 536) virtually proves it. These photographs are intensely interesting, especially since *Benthosaurus* has not been reported from the Mediterranean. Edgerton also photographed a fish that he called *Halargyreus*, probably the species listed here as *Lepidion lepidion* (p. 158).

(Zenkevich, Birschstein and Beliaev, 1954, p. 67). The only other fish known from below 7000 meters is a specimen of *Bassogigas* trawled by the *Galathea* in 7130 meters in the Sunda Trench, which is in the Indian Ocean off Java (Perlman, 1952, p. 66; Bruun, 1953, pp. 261, 262, fig.; 1955, pl. 7). Known below 6000 meters are *Grimaldichthys profundissimus* (p. 218) and a new genus and species of the family Liparidae taken by the *Galathea* from the Kermadec Deep in 6660 meters (Bruun, 1953, in litt.; 1955, pl. 6).

DISTINCTIVE CHARACTER OF DEEP-ABYSSAL FAUNA

About 260 benthic species have been reported from below a depth of about 2000 meters. They belong to 111 genera and thirty-five families. Even should some forms prove to be pelagic there is a considerable increase in number at these lesser depths over those found on the comparatively unknown abyssal plain. The representation is still poor when compared to the more widely explored upper regions, yet individual hauls from these depths have at times yielded large numbers of diverse animal forms, and a further increase in number may be expected with further exploration.

Twenty-three of the families are entirely or predominantly composed of deep-sea fishes, and nine (Scylliorhinidae, Squalidae, Gadidae, Acropomatidae, Zoarcidae, Brotulidae, Cottidae, Liparidae and Ogocephalidae) exhibit a wide bathymetric range, containing numerous shallow-water forms and even, in two cases, fresh-water forms, in addition to many deep-sea species. Only three of the thirty-five benthic families represented in deep-abyssal waters are typical of coastal areas—Rajidae, Congridae and Paraperceidae—and none of these is without specialized deep-water genera.

Brotulids predominate in number of genera, macrourids in number of individuals. The families Alepocephalidae, Zoarcidae and Liparidae are also well represented.

Most of the species found exclusively below 2000 meters are known from only a few specimens. Only about forty-three may with any degree of certainty be thought to occur normally in deep-abyssal waters and many of the species listed are doubtless only rare or accidental at these depths. However, a critical examination of the records of deep-abyssal genera proves that only *Raja* is common in surface waters and that almost none of the other genera occur above depths of about 200–400 meters. It is evident that the deep-abyssal fish fauna is more distinct than the fauna of the upper deep-sea regions.

ENDEMISM IN DEEP-ABYSSAL WATERS

In the present discussion geographical divisions are necessarily loosely defined and intended as a convenience. Insufficient information prohibits definition of zoogeographical regions in very deep water, with the possible exception of the Arctic, Antarctic and eastern Pacific areas. The deep-abyssal fish fauna is still comparatively unknown and some of the barriers to dispersal found in littoral and sublittoral zones are lacking in deep-abyssal waters, the various faunal areas thus actually being of wider extent and with less distinct boundaries. After a survey of all abyssal animal forms, Ekman (1953) divided the deep sea into four main areas: Atlantic, Indo-pac-Pacific, Antarctic and Arctic. There is little doubt that the two latter regions are characterized by distinct fish faunas but the other two divisions may not prove tenable. The deep-abyssal faunas of the Atlantic, Indian, and Pacific oceans are tied together by several widely distributed benthic species, whose number will undoubtedly be augmented in the future. However, even these forms will probably show regional variations similar to those found among cosmopolitan bathypelagic fishes such as species of *Chauliodus*, *Stomias*, and *Nessorhamphus*, as discovered in recent years through studies of the abundant material collected by the various *Dana* expeditions.

Only two families are confined to one area, Bathydraconidae (Antarctic) and Derepodichthyidae (northeastern Pacific).

There are few endemic genera and almost all of these are monotypic, usually with very few examples known. The only non-monotypic genera are *Bathydraco* Günther (Antarctic, five species), *Bothrocaropsis* Garman (eastern Pacific, three species), and *Aulastomatomorpha* Alcock (north Indian Ocean, two species, three specimens).

The following monotypic genera are endemic.

ARCTIC

Liparidae: *Rhodichthys* Collett

EASTERN ATLANTIC

Alepocephalidae: *Einara* Parr,¹ *Bellozia* Parr

Searsiidae: *Barbantus* Parr¹

Macrouridae: *Echinomacrurus* Roule

Zoarcidae: *Pachycara* Zugmayer

Brotulidae: *Leucochlamys* Zugmayer

¹ Perhaps pelagic.

WESTERN ATLANTIC

Stephanoberycidae: *Stephanoberyx* Gill

EASTERN PACIFIC

Alepocephalidae: *Brunichthys* Parr

Searsiidae: *Mirrorictus* Parr, *Pellisolus* Parr

Derepodichthyidae: *Derepodichthys* Gilbert

Brotulidae: *Leucicorus* Garman, *Sciadonus* Garman

SOUTHEASTERN PACIFIC

Parapercidae: *Macrias* Gill and Townsend

NORTH PACIFIC

Liparidae: *Acantholiparis* Gilbert and Burke

MID-PACIFIC

Stephanoberycidae: *Malacosarcus* Günther

WESTERN PACIFIC

Brotulidae: *Alcockia* Goode and Bean, *Mastigopterus* Smith and Radcliffe, *Enchelybrotula* Smith and Radcliffe, *Typhlonus* Günther

NORTH INDIAN

Congridae: *Promyllantor* Alcock

Acropomatidae: *Brephostoma* Alcock

Brotulidae: *Tauredophidium* Alcock

Thus only twenty-seven (ca. 25 per cent) of the 111 deep-abyssal genera are geographically endemic. Of these the family Brotulidae contains the largest number (eight), followed by the Alepocephalidae and Searsiidae, with seven; Stephanoberycidae, Zoarcidae and Liparidae, each with two; and the following families, each with one: Congridae, Macrouridae, Acropomatidae, Parapercidae, Bathydraconidae and Derepodichthyidae.

ENDEMISM OF SPECIES

With few exceptions, deep-abyssal species confined to a single area are either known from too few examples for evaluation (and some formerly belonging in this category have since turned up in a far distant locality) or are eurybathic species whose centers of distribution are in much shallower strata, such as *Nezumia sclerorhynchus* and *Oxygadus labiatus*. Thus, although a survey reveals a considerable amount of endemism, it is based largely upon species

that have been taken very rarely, and their endemism must be held in doubt until further investigations confirm the fact that they are limited to one area. Many, or even most, of these rare forms may some day be found elsewhere in deep water. It must be kept in mind that many parts of the oceans are still comparatively little explored, including the southern seas generally and vast areas in the central parts of the Pacific and Atlantic oceans.

Of the comparatively well-represented benthic families, the Liparidae shows the largest percentage of endemic species, twelve of the thirteen deep-abyssal forms (about 92 per cent) being confined to one region. About 87.5 per cent of the zoarcids are endemic, 85 per cent of the brotulids, 72 per cent of the alepocephalids, 67.5 per cent of the macrourids, and 50 per cent of the halosaurids.

Except for the polar regions, the greatest amount of endemism among species is found in the eastern Pacific. Within the limits of our knowledge the region is fairly well defined abyssally in regard to fishes. Fifty-six of the sixty-six deep-abyssal species (85 per cent) are endemic, and of the remaining ten, four are found elsewhere only in the adjoining north Pacific region. All but five of the endemic forms are known from only a few specimens each, however, and of these only one, *Bassogigas digittatus*, is primarily deep-abyssal. The other four, *Lionurus lolepis*, *Melanostigma pammelas*, *Dicrolele filamentosa* and *D. nigra*, are apparently only accidental below 2000 meters.

Of the six non-endemic eastern Pacific species (excluding those found elsewhere only in the north Pacific), *Hemimacrus acrolepis* reaches across the north Pacific to Japan; *Antimora rostrata* is cosmopolitan; *Ilyophis brunneus* and *Bathysaurus mollis* are found in widely separated areas; *Bathylaco nigricans* is known also from the western Atlantic; and *Mixonus caudalis* is found in the Indian Ocean. There is little indication of relationship between species of the eastern and western Pacific regions.

In the eastern Atlantic, including the one Mediterranean species, there are about thirty-six endemic species (about 40 per cent). Two of these, *Rouleina attritus* and *Bassogigas crassus*, also occur normally below 2000 meters, while five of them have their centers of distribution at higher levels. The other endemic species are known from only one to four specimens each.

The western Pacific, including the southern portion, has twenty-two endemic species (about 52.5 per cent), only one of them, *Nezumia parvipes*, being more than accidental below 2000 meters.

The north Pacific has eleven endemic forms (58 per cent), all known from only a few specimens except *Macrourus cinereus*, which is a straggler in the deep-abyssal zone.

Of the nineteen species (ca. 57.5 per cent) endemic in the northern Indian Ocean, *Bassozetus glutinosus* and *Porogadus trichiurus* are probably also common below 2000 meters, while *Macrourus woodmasoni* has a higher center of distribution.

In the western Atlantic there are about fifteen species (22.8 per cent) not found elsewhere; two, *Lycodes atlanticus* and *Lycodonus mirabilis*, are known principally in deep-abyssal waters; one, *Gaidropsarus ensis*, is perhaps deep-abyssal in the southern part of its range; one, *Stephanoberyx monae*, has its center of distribution in shallower water; and the remainder are known from too few specimens for evaluation.

In the Arctic region, characterized by negative temperatures, five of the seven species are endemic, *Rhodichthys regina* being also known from several deep-abyssal captures.

The seven Antarctic species are all known from only a few specimens but it may be significant that the two non-endemic forms are found elsewhere only in neighboring south Atlantic waters.

The three species found nowhere but in the central Pacific, the five endemic South African forms, and the two from the southeastern Pacific are also represented by only one or a few specimens each.

Not one deep-abyssal species has been taken exclusively in the central Atlantic. All forms found there have been caught also in the eastern and/or western Atlantic except *Bassozetus compressus*, which has been reported from the mid-Atlantic and the western Pacific.

As pointed out by Ekman (1953, p. 305) the Mediterranean Sea possesses an "archibenthal-abyssal" fauna, not a true abyssal one. Only three species¹ have been reported with certainty from below 2000 meters in the Mediterranean: *Centroscymnus coelolepis*, *Lepidion lepidion*, and *Chalinura mediterranea*. The last-named species is endemic but is closely related to the eastern Atlantic *C. murrayi*. Only five other deep-abyssal fishes have been reported from the Mediterranean (but not below 2000 meters): *Alepocephalus rostratus*, *Bathypterois dubius*, *Hymenocephalus italicus*, *Nezumia aequalis* and *N. sclerorhynchus*. All are more or less eurybathic forms.

¹ Four, including the one seen and photographed (p. 81).

It will be noted in going through the list of species that many of them, although they are known from only a few specimens, are found in widely separated areas; such are *Aldrovandia phalacra*, which is known from the eastern Atlantic and Indian oceans, and *Bathysaurus mollis*, known from the eastern Atlantic and also from the eastern and western parts of the Pacific.

The foregoing distributional analysis, which shows that families and genera exhibit very little endemism in deep-abyssal waters, suggests that time is the greatest barrier to the dispersal of deep-abyssal fishes. Final analysis of the endemism present on the species level will have to be determined by future investigations; material at the present time is far too inadequate. It will be especially interesting to learn if the present apparent affinity, on the species level, of the deep-abyssal fish fauna of the waters around South Africa to that of the northern Atlantic is based only upon the fact that the Atlantic fauna is better known than that of similar depths in the Indian Ocean; or whether the pathway between South Africa and the Atlantic is actually an easier one to travel than routes between South Africa and other areas in the Indian Ocean.

Of the twenty-one deep-abyssal species found in South African waters five are endemic and fifteen occur also in the Atlantic, while only five are common to the Indian Ocean and only seven to the Pacific. It seems fairly certain that some fishes have spread between the Indian and north Atlantic oceans via South Africa (cf. *Bathysaurus ferox*, *Aldrovandia macrochir*, *Venefica proboscidea*). Communication routes throughout the Atlantic seem to be relatively open, while distances in the Pacific are apparently not so easily bridged.

Another question of great interest is the apparent isolation, faunistically, of the deep-abyssal eastern Pacific region in respect to fish species. Vast stretches of barren areas such as those found in some parts of the Pacific may slow the spreading of many benthic species, thus allowing time for the development of an endemic fauna in the eastern section. However, no conclusions can be reached on the relative composition of this fauna, as practically no bottom fishing has been carried on in deep-abyssal waters in this region since the *Albatross* expeditions of the late nineteenth and early twentieth centuries. Its relationships on the basis of present knowledge are about equally divided between the Atlantic and other sections of the Pacific, although, if the species common to the adjoining north Pacific area are excluded, the eastern Pacific fish

fauna, in regard to species, is closer to that of the north Atlantic than to any other.

Endemic species characterize a region. It is through widespread forms that paths of dispersal may be studied. At present only a few such species are known but even these few serve to emphasize the effectiveness of barriers isolating the Arctic and Antarctic deep-abyssal, as well as that of the Mediterranean. *Antimora rostrata*, which has spread farther than any other known benthic deep-abyssal species, may be expected to turn up in the virtually unexplored southeastern Pacific, where it is so far unknown. It is otherwise absent only from the northern Indian Ocean, the Mediterranean, and the polar regions. Several species show a distributional pattern suggesting a minimum of barriers to dispersal in southern seas, for example, *Bathysauropsis gracilis*, *Nematonurus armatus*, and *Lionurus filicauda*.

THE BATHYPELAGIC FISHES

Of the many bathypelagic (as contrasted with the benthic) fishes known to science, not one species can certainly be said to inhabit waters deeper than 3660 meters. Only a few are known from enough individuals to warrant their inclusion in the present discussion, and of these only the following seven seem to be more common below than above 2000 meters: *Cyathothone obscura*, *Gonostoma bathyphilum*, *Serrivomer parabeani*, *Cyema atrum*, *Melamphaes nigrescens*, *Atrophacanthus danae*, and *Edriolychnus schmidti*. Records of *Eurypharynx pelecanooides* are almost equally divided above and below, its principal area of occurrence being between about 1400 and 2500 meters.

Since all oceanic animal life is presumably dependent upon the production of plants in the upper lighted zones of the sea, bathypelagic organisms would be expected to thin out quantitatively in waters below the plant-producing zone. However, it need not follow that life is lacking in the deepest intermediate layers. The daily vertical migrations undertaken by some of the small pelagic and bathypelagic organisms, including fishes, that belong near the bottom of the marine food pyramid, are a factor in the ecology of deep-abyssal waters that has not always received enough emphasis.¹ Some bathypelagic fishes, for example, certain species of the families Myctophidae and Gonostomatidae, which occur in enormous num-

¹ Marshall (1954, pp. 157-181, 334-349) has given a remarkably clear picture of the vertical distribution of bathypelagic life.

bers, travel upward from the depths at night to feed near, or nearer, the surface. When they return to their respective deeper levels by day they serve as food for the larger organisms that may be confined to those depths. It is also quite probable that in spite of the emphasis given to the enormous quantity of life produced in the upper sea layers, the volume has been underestimated rather than exaggerated and there are perhaps no intermediate regions incapable of supporting abundant life in areas where surface organisms are plentiful.

It seems particularly significant that Houot (1955, p. 249), who has participated in numerous bathyscaphe dives in the Mediterranean and the Atlantic to depths as great as 4000 meters, judged the density of the plankton to be about equal from 150–250 meters to within two or three meters of the bottom.

The presence of dense plankton in abyssal and deep-abyssal waters would account for the food supply of benthic animal communities and would increase the importance and complexity of the vertical migrations of bathypelagic organisms. Regarding the density of organisms in intermediate waters, Cousteau (1954, p. 78; 1954, personal communication), in his descent to the bottom at a depth of 1200 meters in the Mediterranean off Toulon, was forcibly impressed with the fact that pelagic life increased, relative to depth, both in volume and in the size of the individual. Beebe (1934, pp. 700, 703), who was lowered in the bathysphere to 900 meters, off Bermuda, reported "the total number of creatures unbelievable" and was astounded at the number of large animals present in deep water. MacLeish (1954, p. 88), like Beebe and Cousteau, was impressed with the amount of plankton: "The plankton here [350–1400 m.] is so dense that it looks like a fine driving snow rushing upward. The water is like a soup. It seems to be half composed of living things."

A few (17) bathypelagic fishes are included here as a part of the fauna of deep-abyssal waters because there seems to be enough evidence to show that their normal range extends to these depths. There are, of course, other little-known forms that may prove to be inhabitants of the deep-abyssal zone. All of the species taken exclusively in nets fished below 2000 meters are known from only one or two specimens each and so cannot be considered here. There is the ever-present possibility that the species are "rare" merely because of their agility in escaping the slowly moving nets; or because the few specimens caught may have entered open nets at

higher levels. Certain bathypelagic forms, including those mentioned above, will be discussed in the list of species along with the benthic forms known or thought to inhabit the sea floor below 2000 meters. All species of the order Ceratioidea have been listed, whether known to be deep-abyssal or not, partly for the reasons given on page 232 and partly because Bertelsen's studies (1951), based on the *Dana* material, present an evaluation of the group to which only scattered additions are to be expected in the near future.

The following species have been taken in closing nets hauled in deep-abyssal intermediate waters but have been omitted from the list either because they have been captured so rarely that the records may be accidental or because they are common in shallower depths (see also families Chiasmodontidae, p. 193 and Melamphaidae, p. 191).

Dolichopteryx sp., one specimen taken by the *Discovery* in the Atlantic (ca. 5° N., 17° W.) at a depth of 2500–2700 meters. Norman (1930, p. 271) identified this example with *D. longipes* Vaillant, but Parr (1937, p. 34) considered it to represent another species, perhaps *D. binocularis* Beebe.

Electrona parallela Lönnberg, two specimens, also taken by the *Discovery* in the Atlantic, off South Africa, 2500–2000 meters. The species is otherwise known from only seven specimens, two in 350–400, one in 1000 and four in 2000 and 2500 meters.

Diogenichthys laternatus Garman, four specimens caught by the *Discovery* off South Africa, 2500–2000 meters. The species is an abundant one and cosmopolitan in distribution between 34° N. and 34° S.

It is well to note here that lack of data on the habits of deep-sea fishes often makes it impossible to determine whether a species is primarily benthic or bathypelagic; and also that some forms probably belong in both categories. Some benthic species rise to intermediate waters at spawning time, while there are undoubtedly bathypelagic species that seek bottom for spawning. It is also quite possible that some bathypelagic fishes approach bottom in pursuit or in search of prey as well as that various benthic forms leave the sea floor for the same reasons. Then, too, bathypelagic species undergoing daily vertical migrations live normally over great depths but where such depths adjoin shallower areas it is logical to find them on or near the bottom at lesser depths (see discussion of *Cyclothone microdon*, p. 125). There is also a growing belief, first suggested by Dr. August Krogh in June, 1933, at a symposium on the conditions of existence of aquatic animals (Krogh, 1934, p. 436), that there exists a benthopelagic fauna, which might well include a num-

ber of fishes not actually living upon the bottom and yet not entirely independent of it.

Monod's observations (1954, p. 1951) on bottom in 1400 meters off Dakar (eastern Atlantic) in some respects change the current concept of bathypelagic life, for he saw typical bathypelagic organisms (medusae, red shrimps, chaetognaths) actually close to or in contact with the bottom. The fact that both micro- and macroplankton extend all the way to the sea floor (at least in some regions) explains several benthic captures of typically bathypelagic fishes, for example, *Avocettina infans* (p. 150).

The phenomenon of ontogenetic vertical migration, undertaken by members of diverse groups of bathypelagic (and perhaps benthic) fishes, also considerably complicates "placing" a species at any particular depth. Most ceratioids, for example, hatch from the egg in depths of 50 to 200 meters and make a rapid descent, upon metamorphosis, to about 2000-2500 meters, at which depth are also found most of the mature females and the metamorphosing or metamorphosed males. After metamorphosis, females are most frequently found between 1500 and 2000 meters, but upon reaching maturity they again return to the 2000-2500 meter level (Bertelsen, 1951). Actually, therefore, the normal habitat of these fishes is 50-2500 meters, although some species are undoubtedly truly deep-abyssal, since the males seem to keep to the greater depths whether or not they become parasitic upon the females. Known specimens of most ceratioid species are far too few and their life-histories too little known to allow an accurate estimate of their maximum occurrence, as adults, at any particular level; and although the exaggerated sexual dimorphism found in these fishes further obscures an understanding of their ecology, groups with seemingly simpler life-histories are as little understood.

A certain amount of conjecture is therefore involved in separating deep-sea fishes into benthic and bathypelagic groups. Conjecture plays a major part in almost any study concerned with deep-sea life. Among various impressions gained from a fairly thorough survey of the literature dealing with deep-sea fishes, irrelevant to the present work, is the fact that many species, particularly the "rare" ones, are young, some even larval, at an unusually large size. One of the theories advanced to explain this phenomenon is that low temperature and other physical factors of the environment cause deep-sea fishes to undergo a protracted juvenile period and even, occasionally, to reach the breeding stage before acquiring all adult characters. It has been suggested that some species retain

their larval forms throughout life, paralleling the phenomenon of neoteny in the Amphibia. It is possible that in many cases only the young have been caught, the larger adult forms escaping the nets; in this event it would not be at all surprising to find some truly gigantic species in deep water.

CONCLUSION

The original purpose of this report was to make available as many references as possible to the known fish fauna of deep-abyssal waters and to present a summary of the information gleaned through such a survey, in the hope of adding to our knowledge of the zoogeography of the area. During the course of the work it has become apparent that a presentation of known facts serves chiefly to accentuate the many remaining unknown. Figures and percentages offered here are almost meaningless when one realizes how few bottom hauls have been made in deep-abyssal waters. In the boreal north Pacific, for example, only nineteen bottom hauls have been made deeper than 2000 meters, yielding twenty specimens of fishes. The number of such hauls made in Arctic and Antarctic waters is probably still less. Even in the most extensively explored area, the eastern Atlantic, only a few hundred such trials have been made and by no means all of these have been successful; for instance, of 137 deep-abyssal fishing efforts undertaken by the Prince of Monaco during many expeditions in the Atlantic between 1888 and 1914, the gear was lost in twenty-eight cases, in sixteen it failed to reach bottom, and in several instances it came to the surface virtually empty. In other words, about a third of the attempts were unsuccessful.

Negative results are not, however, valueless, and among other things they serve to emphasize the importance of such expeditions as that undertaken by the *Galathea*¹ and the fact that a clear pic-

¹ A brief indication of future changes in the distribution of deep-abyssal fishes may be seen in comparing with the text the following data seen (1953) with a few of the *Galathea* fishes on exhibition at the Zoological Museum in Copenhagen.

Bathysaurus mollis, Indian Ocean off East Africa, 4060 meters.

Benthosaurus, Indian Ocean, Mozambique Channel, 3485 meters.

Bathymicrops (Bruun, 1955, pl. 5), north of Madagascar, 4820 meters; Indian Ocean off South Africa, 4360 meters; northeast of New Zealand, 5850 meters.

Macrouroides inflaticeps, Madagascar-Mombasa, 4820 meters.

Aphyonius, off Durban, 4360 meters.

Bassogigas, Java Deep, 7150 meters.

Acanthonus armatus, Gulf of Guinea off San Tomé, 2550 meters.

Liparidae, gen. and sp. nov., Kermadec Deep, 6000 meters.

ture of life at the greatest depths of the sea depends upon many more such investigations.

NOTE

In May, 1955, the United States Fish and Wildlife Service Research Vessel *Oregon* trawled in the Gulf of Mexico (2104–2194 meters) a number of benthic fishes, which will be described in detail at a future date. Some of these new records are reported here and, excepting specimens of *Gadomus longifilis* and *Melanocetus murrayi* from earlier *Oregon* hauls, are the only new records included. See *Alepocephalus productus*, p. 104; *Conocara murrayi*, p. 115; *Benthosaurus grillator*, p. 131; *Bathypterois phenax*, p. 133 (first deep-abyssal capture); *Ipnops murrayi*, p. 136; *Venefica procera*, p. 141 (first deep-abyssal capture); *Synaphobranchus kaupi*, p. 145; *Bassozetus normalis*, p. 208; *Porogadus miles*, p. 211; and *Porogadus subarmatus*, p. 213.

EDITORIAL NOTE

[The practice of omitting parentheses from authors' names when parentheses are called for by the International Rules of Nomenclature was established for the zoological publications of Chicago Natural History Museum by the late Wilfred Hudson Osgood as a protest against what seemed to him an "outworn nomenclatural practice." We are conforming to this practice in concurrence with Dr. Osgood's argument.—KARL P. SCHMIDT]

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Synonymies¹ and Distribution

ELASMOBRANCHII

Of the relatively few deep-sea elasmobranchs, none has ever been taken below 3660 meters² and very few are recorded deeper than 2000 meters. The widely distributed species, *Hexanchus griseus* Bonnaterre, has been reported once from deep-abyssal waters (Bragança, 1904, p. 28), off Portugal in 1875 meters, but it is unlikely that the shark was actually caught at that depth. It has been taken frequently in much shallower water and has been seen on the surface at night (Fraser-Brunner, 1935, p. 319). *Isistius brasiliensis* Quoy and Gaimard, another far-ranging pelagic shark, has been recorded twice from deep-abyssal waters but, like *Hexanchus griseus*, has frequently been caught in much shallower water as well as on the surface at night, and the specimens reported from 1829 and 2488 meters (Bigelow and Schroeder, 1948, p. 509) may well have entered the nets in transit.

Family SCYLLIORHINIDAE

Although this family contains numerous deep-sea species, only one has been reported from the region under consideration.

***Apristurus indicus* Brauer**

Scylliorhinus indicus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, **15**, (1), p. 8, pl. 14, fig. 1—Indian Ocean, ca. 2° N., 47° E. and ca. 13° N., 47° E., 1289 and 1840 meters, type locality not designated.

Scylliorhinus indicus Regan, 1908, Ann. Mag. Nat. Hist., (8), **1**: 459; Lloyd, 1909, Mem. Indian Mus., **2**: 139; Holt and Byrne, 1909, Ann. Mag. Nat. Hist., (8), **3**: 279; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (1), p. 19.

Apristurus indicus Garman, 1913, Mem. Mus. Comp. Zool., **36**: 97; Bigelow and Schroeder, 1944, Proc. New England Zool. Club, **23**: 22; 1948, Mem. Sears Found. Mar. Res., **1**, (1), p. 221.

Scylliorhinus (Halaelurus) indicus Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, **7**, (1), p. 10; Misra, 1950, Rec. Indian Mus., **45**: 12; 1952, op. cit., **49**: 102, fig. 4, a.

Pentanchus indicus Fowler, 1941, Bull. U. S. Nat. Mus., **100**, (13), p. 60.

Deep-abyssal record.—Gulf of Aden, 1840 meters, one specimen.

¹ References marked with an asterisk have not been seen by the author.

² However, one was seen at a depth of about 4000 meters (p. 81).

Distribution.—Indian Ocean off Somaliland, in the Gulf of Aden and the Gulf of Oman, one deep-abyssal record and four specimens in 1061–1289 meters. Eastern Atlantic, one young specimen off southwest Ireland in 1225–1409 meters. Probably accidental in deep-abyssal waters.

Length.—132–336 mm.

Family SQUALIDAE

The only elasmobranch known to inhabit deep-abyssal waters more than accidentally is a squaloid shark, *Centroscymnus coelolepis*. *Etmopterus princeps* is probably only accidental below 2000 meters, while *E. spinax* Linnaeus and *E. pusillus* Lowe, archibenthic species that are pelagic or semi-pelagic with one deep-abyssal record each, are not included in the present discussion. Numerous species of the family are found in shallower deep-sea areas.

Etmopterus princeps Collett

Etmopterus princeps Collett, 1904, Vidensk. Selsk. Forh., 1904, (9), p. 3—Faroe Channel, 1100 meters.

Etmopterus princeps Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 29, pl. 1, figs. 1, 2; Garman, 1913, Mem. Mus. Comp. Zool., 36: 222; Bigelow and Schroeder, 1948, Mem. Sears Found. Mar. Res., 1, (1), p. 488; 1954, Bull. Mus. Comp. Zool., 112: 46; Bigelow, Schroeder and Springer, 1953, op. cit., 109: 241, 246, fig. 8.

Spinax princeps Regan, 1908, Ann. Mag. Nat. Hist., (8), 2: 44; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 21, pl. 3, fig. 4.

Spinax (Etmopterus) princeps Murray and Hjort, 1912, Depths of Ocean, p. 392.

Deep-abyssal record.—Eastern Atlantic, ca. 35° N., 8° W., 2055 meters, one specimen.

Distribution.—Eastern Atlantic, one deep-abyssal record and four specimens off the Faroe Islands and in the Faroe-Shetland Channel in 1100 and 750 meters. Western Atlantic from off Nova Scotia to southern New England, fifty-four specimens, 567–951 meters. Apparently accidental in deep-abyssal waters.

Length.—190–728 mm.

Centrophorus squamosus Bonnaterre

Squalus squamosus Bonnaterre, *1788, Tabl. Encyc. Meth. Ichth., p. 12—Atlantic off Portugal.

Squalus squamosus Gmelin, *1788, Syst. Nat. Linn., ed. 13, 1: 1502.

Lepidorhinus squamosus Bonaparte, *1838, Nuov. Ann. Sci. Nat., 2: 207; Garman, 1913, Mem. Mus. Comp. Zool., 36: 211; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 118; de Buen, 1931, Bol. Oceanogr. Pesc., Inst. Esp. Oceanogr., 171: 15; 1935, Not. Res. Inst. Esp. Oceanogr., (2), 88: 32; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 78, fig. 25; Fraser-Brunner, 1938, Ann. Mag. Nat. Hist., (11), 2: 410; Bertin, 1939, Bull. Mus. Hist. Nat. Paris, 11: 75; Coelho, 1942, Trav. Stat. Biol. Marit. Lisbonne, 46: 8.

Centrophorus squamosus Müller and Henle, 1841, Syst. Besch. Plagiost., p. 90, pls. 33, 34; Lowe, 1852, Ann. Mag. Nat. Hist., (2), 10: 55; Bocage and Capello, 1864, Proc. Zool. Soc. London, 1864: 260; *1866, Peixes Plagiost., 1: 27, pl. 3, fig. 2; Capello, *1870, Journ. Sci. Math. Phys. Nat., 2: 144; *1880, Cat. Peixes Portugal, p. 48; Hilgendorf, *1888, Arch. Naturg. (2), 54: 213; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 69, pl. 2, fig. 3, and pl. 3, fig. 2; Holt and Calderwood, 1895, Sci. Trans. Roy. Dublin Soc., 5: 372, pl. 43, fig. 1, text fig.; Goode and Bean, 1895, Ocean. Ichth., p. 13; Vieira, *1898, Cat. Peixes Portugal, p. 14; Saemundsson and Jensen, 1899, Vidensk. Medd. Dansk naturh. Foren., 1899: 409, pl. 3; Bragança, 1902, Bull. Camp. Sci. Amelia, 1: 76; 1904, Res. Invest. Sci. Amelia, Ichth., 2: 74, 106; Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 19; Regan, 1908, Ann. Mag. Nat. Hist., (8), 2: 49; Holt and Byrne, 1910, Rep. Fish. Ireland 1908, Sci. Invest., 5: 1; Seabra, *1911, Bull. Soc. Portug. Sci. Nat., 5: 198; Murray and Hjort, 1912, Depths of Ocean, p. 392, fig. 256; Roule, 1912, Bull. Inst. Oceanogr. Monaco, 243: 11; Saemundsson, *1926, Fisk. (Pisces Islandiae), p. 475, fig. 250; *1927, Syn. Fishes Iceland, p. 51; 1932, Faune Ichth. Atl. Nord, 10, fig.; 1949, Zool. Iceland, 4, (72), p. 121 (further refs., Iceland); Hickling, 1928, Ann. Mag. Nat. Hist., (10), 2: 196; Lozano Rey, 1928, Fauna Ibérica, Peces, 1: 440, figs. 144, 145; Noronha and Sarmiento, *1934, Peixes Madeira, p. 134; Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42: 320; Nobre, 1935, Fauna Marinha Portugal, 1: 452; Ehrenbaum, *1936, Naturg. wirtsch. Bedeut. Seefische Nordeur., p. 287; Bigelow and Schroeder, 1948, Mem. Sears Found. Mar. Res., 1: 451; Bigelow, Schroeder and Springer, 1953, Bull. Mus. Comp. Zool., 109: 225.

Machephilus dumerilli Johnson, 1867, Proc. Zool. Soc. London, p. 713.

Centrophorus dumerili Günther, 1870, Cat. Fishes Brit. Mus., 8: 422; Goode and Bean, 1895, Ocean. Ichth., p. 13; Regan, 1908, Ann. Mag. Nat. Hist., (8), 2: 49.

Centrophorus squamosus var. *dumerili* Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 69, pl. 3, fig. 3.

Deep-abyssal record.—Eastern Atlantic off Portugal, 1875 meters, one specimen.

Distribution.—Eastern Atlantic from Iceland and the North Sea to Portugal, Madeira and the Azores, common between about 400 and 1500 meters, one deep-abyssal record.

Length.—260–1500 mm.

Remarks.—Hickling (1928, p. 196) believed the species to be pelagic. It probably does not reach deep-abyssal waters and is perhaps accidental even below 1000 meters. The young specimen reported by Roule (1912) from the Mediterranean near Monaco in 2368 meters has been shown to be a young *Centroscymnus coelolepis* by Tortonese (1952, p. 387), who suggested that the specimens from Nice and Monaco recorded by Carus (1893, p. 503) are probably referable to that species also. *C. squamosus* probably does not inhabit the Mediterranean.

Centroscymnus coelolepis Bocage and Capello. Table 1.

Centroscymnus coelolepis Bocage and Capello, 1864, Proc. Zool. Soc. London, p. 263, fig. 4—Atlantic off Portugal.

Centroscymnus coelolepis Capello, *1870, Journ. Sci. Math. Phys. Nat., 2: 144; de Buen, 1935, Not. Res. Inst. Esp. Oceanogr., (2), 88: 31; Ehrenbaum, *1936, Naturg. wirtsch. Bedeut. Seefische Nordeur., p. 287; Coelho, 1942, Trav. Stat. Biol. Marit. Lisbonne, 46: 10; Bigelow and Schroeder, 1948, Mem. Sears Found. Mar. Res., 1, (1), p. 494, figs. 94, 95 (complete synonymy); 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 52, fig. 20; 1954, Bull. Mus. Comp. Zool., 112: 47, fig. 2; Tortonese, 1950, Arch. Zool. Ital., 35: 132; 1952, op. cit., 37: 386, fig. 1; Brandes, Kotthaus and Krefft, 1954, Cons. Perm. Int. Expl. Mer, Ann. Biol., 10: 45.

Centrophorus squamosus Carus, 1893, Prodr. Faunae Medit., 2: 503; Neuville, 1897, Bull. Mus. Hist. Nat. Paris, 3: 55; Roule, 1912, Bull. Inst. Océanogr. Monaco, 243.

Centrophorus coelolepis Saemundsson, 1949, Zool. Iceland, 4, (72), p. 122 (further refs., Iceland).

Scymnodon melas Bigelow, Schroeder and Springer, 1953, Bull. Mus. Comp. Zool., 109: 233, fig. 5.

Deep-abyssal records.—Western Mediterranean, 2330–2718 meters, thirty-five specimens, most of them taken in traps, one to seven per haul.

Eastern Atlantic in the Gulf of Gascony and off the Azores and Portugal, 1875–2620 meters, eighteen specimens.

Distribution.—Eastern Atlantic from Iceland and Faroe Bank to Cape Verde, Madeira and the Azores, center of distribution between 1000 and 2000 meters. Western Mediterranean, center of distribution below 2000 meters. Western Atlantic from off Newfoundland to off New York and Delaware Bay (38°–39° N.), 330 to 1153–1235 meters.

Length.—To 1140 mm.

Remarks.—*C. coelolepis* is apparently the deepest-living shark known. It is partially bathypelagic but its relative frequency in traps set on the bottom proves it to be not exclusively so. Roule

(1919, p. 120) records five trap-catches (twenty-two specimens) from deep-abyssal waters, four in the Mediterranean and one in the Gulf of Gascony.

Family RAJIDAE

Raja hyperborea Collett

Raja hyperborea Collett, *1878, Vidensk. Selsk. Forh., 1878, (14), p. 7—west of Spitzbergen, ca. 79° N., 5° E., 839 meters.

Raja hyperborea Knipowitsch, 1926, Trans. Inst. Sci. Explor. North, 27: 59, fig. 16; Hickling, 1928, Ann. Mag. Nat. Hist., (10), 2: 197; Essipov, 1937, Prob. Arctic, Arctic Inst. U. S. S. R., 4: 97; *1937, Comm. Fishes Barents Sea, p. 19, fig. 8; Saemundsson, 1949, Zool. Iceland, 4, (72), p. 130; Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 206, figs. 43, 44 (complete synonymy); Andriashev, 1954, Fauna S. S. S. R., 53: 58, figs. 26-28.

Deep-abyssal record.—Arctic Ocean, ca. 69° N., 7° W., 2394 meters, one specimen.

Distribution.—Arctic only, off west Greenland from ca. 60°-78° N. and from east Greenland, Spitzbergen and the eastern Barents Sea south to Iceland and the Faroe Channel. Numerous specimens recorded, 183-293 to 1428 meters, with one deep-abyssal record. Probably accidental in deep-abyssal waters.

Length.—160-860 mm.

Remarks.—According to Essipov (1937, p. 97) the deepest record is 2640 meters.

Raja jenseni Bigelow and Schroeder

Raja jenseni Bigelow and Schroeder, 1950, Bull. Mus. Comp. Zool., 103: 385, pl. 1—Atlantic off U. S. coast, ca. 39° N., 71° W., 1908 meters.

Raja jenseni Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 213, figs. 45, 46 (complete synonymy); 1954, Bull. Mus. Comp. Zool., 112: 60.

Deep-abyssal records.—Western Atlantic off New England, 2296, 1908 meters, two specimens.

Distribution.—Western Atlantic from off Halifax, Nova Scotia, to off mouth of Delaware Bay, two deep-abyssal specimens and three in 366-1088 meters.

Length.—223-850 mm.

Raja fyllae Lütken

Raja fyllae Lütken, *1888, Vidensk. Medd. Dansk naturh. Foren., 1887: 1, pl. 1—Davis Strait, 147 meters.

Raja fyllae var. *lipacantha* Ehrenbaum, 1927, Fische Nord. Ostsee, 12a: 30, fig. 22.

Raja fyllae Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 109; Essipov, 1937, Prob. Arctic, Arctic Inst. U. S. S. R., 4: 97; Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 194, figs. 39, 40 (complete synonymy); 1954, Bull. Mus. Comp. Zool., 112: 54, fig. 3; Andriashev, 1954, Fauna S. S. S. R., 53: 61, figs. 29, 30.

Deep-abyssal record.—Eastern Atlantic, ca. 35° N., 8° W., 2055 meters, one specimen.

Distribution.—North Atlantic and Arctic (but only at positive temperatures according to Jensen, 1948, p. 46) from the Barents Sea and off western Greenland (63°–66° N.) south to ca. 35° N., 8° W. in the east and off Nova Scotia and Georges Bank in the west. One deep-abyssal record and numerous specimens reported between 147¹ and 1797 meters. Probably accidental in deep-abyssal waters.

Length.—72.5–555 mm.

Raja bathyphila Holt and Byrne

Raja bathyphila Holt and Byrne, 1908, Rep. Fish. Ireland 1906, Sci. Invest., 5: 189—Atlantic, ca. 51° N., 12° W., 1230–1634 meters.

Raja bathyphila Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 159, figs. 30, 31, a (complete synonymy); 1954, Bull. Mus. Comp. Zool., 112: 52.

Deep-abyssal records.—Western Atlantic, ca. 41° N., 65° W. and ca. 39° N., 71° W., 2173, 1908 meters, two specimens.

Distribution.—Western Atlantic off the U. S. coast, 36°–41° N., two deep-abyssal specimens and five from five hauls in 1813, 1570, 1527, 896 and 676–823 meters. Eastern Atlantic off southwest Ireland, one specimen, 1230–1634 meters.

Length.—117–463 mm.

Raja microtrachys Osburn and Nichols

Raja microtrachys Osburn and Nichols, 1916, Bull. Amer. Mus. Nat. Hist., 35: 142, fig. 1—off southern California, ca. 32° N., 116° W., 1994 meters (erroneously reported from Guadalupe Island in type description).

Raja microtrachys Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 6.

Deep-abyssal record and distribution.—Eastern Pacific, 1994 meters, one specimen.

Length.—737 mm.

¹ Jensen (1948, p. 44) thought that the shallow depth of capture recorded for the type might have been an error. The shallowest record otherwise is 274 meters.

Raja badia Garman

Raja badia Garman, 1899, Mem. Mus. Comp. Zool., 24: 22, pl. 6, figs. 1, 2—Pacific off Panama, ca. 7° N., 79° W., 2323 meters.

Raja badia Garman, 1913, Mem. Mus. Comp. Zool., 36: 357; Beebe and Tee-Van, 1941, Zoologica, 25: 254, fig.

Deep-abyssal record and distribution.—Eastern Pacific, 2323 meters, one specimen.

Length.—257 mm.

Raja abyssicola Gilbert

Raja abyssicola Gilbert, 1896, Rep. U. S. Fish Comm., 1893: 396, pl. 20—Pacific off the Queen Charlotte Islands.

Raja abyssicola Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 76; Garman, 1913, Mem. Mus. Comp. Zool., 36: 344; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 67, fig. 25.

Deep-abyssal record and distribution.—Eastern Pacific, 2904 meters, one specimen.

Length.—1143 mm.

HOLOCEPHALI

Chimaeroids are principally deep-sea forms but only three species are found in deep-abyssal waters.

Family CHIMAERIDAE**Hydrolagus affinis** Capello

Chimaera affinis Capello, *1868, Journ. Sci. Math. Phys. Nat., 1: 314, 320, pl. 3—Atlantic off Portugal in deep water.

Chimaera affinis Dean, 1906, Publ. Carnegie Inst. Washington, 32: 7, 13, 111, 112, 122, figs. 90, 101; Holt and Byrne, 1910, Rep. Fish. Ireland 1908, Sci. Invest., 4: 5.

Psychichthys affinis de Buen, 1935, Not. Res. Inst. Esp. Oceanogr., (2), 88: 42.

Hydrolagus affinis Bigelow and Schroeder, 1952, Breviora, Mus. Comp. Zool., 8: 5; 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 539, fig. 121 (complete synonymy); 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 79, fig. 35; 1954, Bull. Mus. Comp. Zool., 112: 70.

Deep-abyssal record.—Western Atlantic, ca. 40° N., 66° W., 2360 meters, one specimen.

Distribution.—Eastern Atlantic off Portugal in deep water. Western Atlantic from the Grand Banks of Newfoundland to off

Cape Cod and ca. 39° N. (?)Gulf of Mexico.¹ One deep-abyssal specimen and numerous records in 293–1761 meters. Probably accidental in deep-abyssal waters.

Length.—914–1283 mm.

Hydrolagus purpureus Gilbert

Chimaera purpureus Gilbert, 1905, Bull. U. S. Fish Comm., 23, (2), p. 582, fig. 231—off the Hawaiian Islands.

Chimaera gilberti Garman, 1911, Mem. Mus. Comp. Zool., 40: 90; Fowler, 1928, Mem. Bishop Mus., 10: 26.

Psychichthys purpurascens Jordan and Hubbs, 1925, Mem. Carnegie Mus., 10: 117.

Chimaera purpureus Fowler, 1941, Bull. U. S. Nat. Mus., 100, (13), p. 494.

Hydrolagus purpureus Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), pp. 534, 536.

Deep-abyssal record and distribution.—Pacific off the Hawaiian Islands, 1750–1951 meters, one specimen.

Length.—900 mm.

Family RHINOCHEMAERIDAE

Besides the one species discussed below, the only evidence that members of this family inhabit the deep-abyssal zone is the presence in a haul in the Atlantic (ca. 28° N., 24° W.), at a depth of 5000 meters, of an egg-capsule membrane (Koefoed, 1927, p. 31). Koefoed stated that it probably belonged to a species of *Rhinochimaera*.

Harriotta raleighana Goode and Bean

Harriotta raleighana Goode and Bean, 1895, Proc. U. S. Nat. Mus., 17: 471, pl. 19—Atlantic off U. S. coast, ca. 39° N., 70° W., 1977 meters.

Harriotta raleighana Goode and Bean, 1895, Ocean. Ichth., p. 33, figs. 37–40; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 96; 1900, op. cit., fig. 42; Garman, 1904, Bull. Mus. Comp. Zool., 41: 263, pl. 2, figs. 3–5, pl. 4, fig. 1, and pl. 5, figs. 3–9; 1911, Mem. Mus. Comp. Zool., 40: 95; Dean, 1906, Publ. Carnegie Inst. Washington, 32: 6, 121, 122, figs. 94, 96; Bean and Weed, 1910, Proc. U. S. Nat. Mus., 37: 662, pl. 38; Murray and Hjort, 1912, Depths of Ocean, pp. 394, 417, figs. 260, 307; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 29, pl. 3, figs. 1, 2, text figs. 4–6; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 75, pl. 4, fig. 34; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 145, fig. 60; Roule, 1934, Poiss. Monde Viv. Eaux, 7: 161, 163, pl. 9, text fig.;

¹ Bigelow and Schroeder (1953, p. 544) reported that this specimen is now lost and suggested that it might have been *H. alberti* Bigelow and Schroeder, a species known only from the Gulf of Mexico off Pensacola.

Bigelow and Schroeder, 1953, Mem. Sears Found. Mar. Res., 1, (2), p. 551, figs. 124–126; 1954, Bull. Mus. Comp. Zool., 112: 81, figs. 6, *d*, 6, *e*, 7.

? sp. Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 31, fig. 7.

Deep-abyssal records.—Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, one specimen.

Western Atlantic, 1977 meters, the type.

Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, two specimens.

Distribution.—Eastern Atlantic near the Canary Islands and west of Scotland, two deep-abyssal records. Western Atlantic, 36°–42° N., one deep-abyssal record and forty-four specimens taken between 530–622 and 1813 meters, principally in 700–1000 meters.

Length.—120–1025 mm.

Remarks.—An egg-capsule possibly belonging to this species was taken by the *Michael Sars* in 1365 meters (ca. 28° N., 13° W.). Indo-Pacific species of the family are considered by some authors to be forms of *H. raleighana*. None of these has been reported from deep-abyssal waters.

TELEOSTOMI

Family ALEPOCEPHALIDAE

Although certain species of the families Alepocephalidae and Searsiidae¹ are certainly pelagic, there is reason to believe that others may be benthic forms, having been caught principally or exclusively in apparatus fishing on bottom. The possibility that some species live pelagically as young needs investigation. All but two of the alepocephalids reported from depths greater than 3660 meters were caught in pelagic nets, and the two exceptions are known from only one specimen each. In deep-abyssal waters there are about thirty-two more species that may have been caught on or just above the ocean floor, most of them represented by too few specimens for evaluation and a few showing a preference for shallower depths. Species of the families Alepocephalidae and Searsiidae taken in pelagic nets hauled below 2000 meters and known from only one or two specimens have been included here in case the species should eventually prove to be benthic or partially benthic in habitat. Many of these fishes probably belong to the benthopelagic fauna found just above the ocean floor.

¹ Separated from the Alepocephalidae by Parr (1951).

It has been impossible to determine the vertical distribution of the comparatively common, widely distributed, pelagic species *Searsia koefoedi* Parr (family Searsiidae), of which there are at least sixteen catches recorded in nets hauled below a depth of 2000 meters, among many more above that depth. Most of the specimens are apparently young, but a survey of the literature reveals no relation between size and depth of capture.

Alepocephalus rostratus Risso

Alepocephalus rostratus Risso, *1820, Mem. Accad. Sci. Torino, **25**: 291, pl. 10, fig. 4—Mediterranean.

Alepocephalus rostratus Risso, 1826, Hist. Nat. Eur. Merid., **3**: 449, pl. 11, fig. 28; Sassi, *1846, Descr. Genova Genov., Pesci, **1**: 111; Cuvier and Valenciennes, 1846, Hist. Nat. Poiss., **19**: 169, pl. 566; Canestrini, *1861, Arch. Zool. Anat. Fisiol. Genova, **2**: 262; Johnson, 1862, Ann. Mag. Nat. Hist., (3), **10**: 285; Günther, 1868, Cat. Fishes Brit. Mus., **7**: 477; 1887, Rep. Sci. Res. Voy. Challenger, Zool., **22**: 223; Gegenbaur, *1878, Morph. Jahrb., **4**, Suppl., p. 1, pls. 1, 2; Moreau, 1881, Hist. Nat. Poiss. France, **3**: 463, fig. 198; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 148, pl. 11, fig. 1, and pl. 12, fig. 5; Carus, 1893, Prodr. Faunae Medit., **2**: 550; Goode and Bean, 1895, Ocean. Ichth., p. 36, fig. 41; Parona, *1898, Atti Soc. Ligure Sci. Nat. Geogr., **9**: 327; Griffini, *1903, Ittiol. ital., Milano; Ariola, *1904, Aquivolt. Lomb., Milano, **5**; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., **2**: 25; 1908, op. cit., 1906, **9**: 32, pl. 3, fig. 1; Roule, 1919, Rés. Camp. Sci. Monaco, **52**: 5; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (1), p. 32, pl. 1, fig. 2; Gregory, 1933, Trans. Amer. Phil. Soc., **23**, (2), p. 158, fig. 51; ?Roule and Angel, 1933, Rés. Camp. Sci. Monaco, **86**: 4; Noronha and Sarmento, *1934, Peixes Madeira, pp. 105, 134; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 185, fig. 74; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., **11**: 67, fig. 8; Maul, 1948, Bol. Mus. Mun. Funchal, **3**: 10, fig. 2; Tortonese and Trotti, 1949, Atti Accad. Ligure Sci. Lett., **6**, (1), p. 34; Arté, 1951, Publ. Inst. Biol. Aplic. Barcelona, **8**: 157, fig. 1; Parr, 1952, Bull. Mus. Comp. Zool., **107**: 257.

?*Alepocephalus* sp. Fage, 1910, Ann. Inst. Océanogr. Paris, **1**, (7), p. 4, fig. 2.

Deep-abyssal records.—Eastern Atlantic, off Cape Verde, 3655 meters, one specimen.

Eastern Atlantic, off North Africa, 2330, 2190, 2115 meters, five specimens.

Eastern Atlantic, off the Azores, 2235 meters, one specimen.

Distribution.—Eastern Atlantic, 16°–51° N., 3°–28° W., at least eighty-three specimens recorded, seven from deep-abyssal waters and the rest in 300–1804 meters. Mediterranean at Nice and near Blanes, Spain, two specimens. (?) Western Atlantic, ca. 42° N.,

62°–63° W., three specimens, 1332–1458 meters. Center of distribution probably between 1000 and 2000 meters.

Length.—70–698 mm.

Remarks.—The western Atlantic record was based on three damaged specimens (Roule and Angel, 1933, p. 4), which should be re-examined before being assigned to this species.

Alepocephalus agassizi Goode and Bean

Alepocephalus agassizii Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 218—Atlantic off U. S. coast, ca. 38° N., 73° W., 1687 meters.

Alepocephalus agassizii Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 223; Goode and Bean, 1895, Ocean. Ichth., p. 37, fig. 45; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 453; 1900, op. cit., fig. 197; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 8; Ehrenbaum, 1902, Fauna Arct., 2: 139; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 36; Schroeder, 1940, Copeia, p. 231; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 64; Parr, 1952, Bull. Mus. Comp. Zool., 107: 258.

Deep-abyssal records.—Western Atlantic, 39°–40° N., 68°–69° W., 2012–2286 meters, at least four specimens, from four hauls.

Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, three specimens.

Distribution.—North Atlantic from Davis Strait (ca. 63° N.) and southwest of Iceland (ca. 62° N., 28° W.) to off Ireland in the east (ca. 50° N., 11° W.) and to 36° N. in the west, with one capture in ca. 15° N., 63° W. At least twenty-four specimens known, seven of them deep-abyssal, others in 984–1797 meters. Perhaps not rare in deep-abyssal waters, although the center of distribution may be higher.

Length.—222–642 mm.

Alepocephalus productus Gill

Alepocephalus productus Gill, 1883, Proc. U. S. Nat. Mus., 6: 256—Atlantic off U. S. coast, ca. 39° N., 70° W., 2491 meters.

Alepocephalus productus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 223; Goode and Bean, 1895, Ocean. Ichth., p. 37, fig. 46; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 452; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 38; Parr, 1952, Bull. Mus. Comp. Zool., 107: 258.

Deep-abyssal records and distribution.—Western Atlantic, 2491 meters, the type.

Western Atlantic, Gulf of Mexico, 2104–2194 meters, one specimen (*Oregon Station 1303*, 28° 47' N., 87° 50' W., May 26, 1955).

Eastern Atlantic, ca. 35° N., 8° W., 2055 meters, one specimen.

Length.—345–360 mm. without caudal. Length of type not stated.

***Alepocephalus fundulus* Garman**

Alepocephalus fundulus Garman, 1899, Mem. Mus. Comp. Zool., 24: 293, pl. 57, fig. 2—Pacific off Panama, 6°–7° N., 79°–82° W. (type locality not designated).

Alepocephalus fundulus Parr, 1952, Bull. Mus. Comp. Zool., 107: 258.

Deep-abyssal records and distribution.—Eastern Pacific, 3057, 2322 meters, two records.

Length.—?–419 mm.

***Alepocephalus australis* Barnard**

Alepocephalus australis Barnard, 1923, Ann. So. Afr. Mus., 13: 440—off Cape Point, South Africa, 1153 meters.

Alepocephalus australis Barnard, 1925, Ann. So. Afr. Mus., 21: 121; ?Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 39, pl. 4, figs. 5, 6; Smith, 1949, Sea Fishes So. Afr., p. 96, fig. 124; Parr, 1952, Bull. Mus. Comp. Zool., 107: 257.

Bathytroctes rostratus Barnard, 1925, Ann. So. Afr. Mus., 21: 122.

Alepocephalus barnardi Norman, 1930, Disc. Rep., 2: 270; Smith, 1949, Sea Fishes So. Afr., p. 96.

Alepocephalus australis barnardi Parr, 1952, Bull. Mus. Comp. Zool., 107: 257.

Deep-abyssal record.—Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, two specimens, somewhat doubtfully assigned to this species.

Distribution.—South Atlantic off Cape Point, five specimens in 1153 and one in 1280 meters. Eastern Atlantic, one deep-abyssal record and one specimen, doubtfully identified with this species, in 1797 meters (ca. 50° N., 11° W.).

Length.—200–500 mm.

***Alepocephalus atlanticus* Roule and Angel**

Alepocephalus edentulus atlanticus Roule and Angel, 1931, Bull. Inst. Océanogr. Monaco, 581: 5—Atlantic, ca. 32° N., 12° W.

Alepocephalus edentulus atlanticus Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 4, pl. 1, fig. 1; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 5.

Alepocephalus atlanticus Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1161.

Deep-abyssal record and distribution.—Eastern Atlantic, 4000 meters, one specimen taken in a pelagic net.

Length.—195 mm.

Talismania bifurcata Parr

Nemabathyroctes bifurcatus Parr, 1951, Amer. Mus. Nov., 1531: 10—Pacific off Panama, ca. 7° N., 79° W.

Talismania bifurcata Parr, 1952, Jour. Washington Acad. Sci., 42: 269.

Deep-abyssal record and distribution.—Eastern Pacific, ?2200 meters, one specimen taken in a pelagic net with 3500 meters of wire out. Depth to bottom 2550 meters. Probably caught on or near bottom.

Length.—202 mm.

Rinoctes nasutus Koefoed

Bathyroctes nasutus Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 50, pl. 3, fig. 10—Atlantic, ca. 34° N., 33° W., 2865 meters.

Rinoctes nasutus Parr, 1952, Bull. Mus. Comp. Zool., 107: 264.

Deep-abyssal records and distribution.—Western Atlantic, ca. 20° N., 80° W., 3886 meters, one specimen.

Eastern Atlantic, 2865 meters, the type.

Length.—122 (standard)—190 mm.

Bathyroctes alveatus Garman

Bathyroctes alveatus Garman, 1899, Mem. Mus. Comp. Zool., 24: 287, pl. 58, fig. 1—Pacific off Colombia and Ecuador, ca. 3° N., 82° W. and 0°36' S., 86° W. (type locality not designated).

Deep-abyssal records and distribution.—Eastern Pacific, 2415, 2068 meters, an unstated number of specimens from two hauls.

Length.—?—190.5 mm.

Bathyroctes macrolepis Günther

Bathyroctes macrolepis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 225, pl. 57, fig. B—Pacific north of Celebes, ca. 2° N., 124° E.

Bathyroctes macrolepis Goode and Bean, 1895, Ocean. Ichth., p. 41, fig. 44; (?) Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 174; Weber and de Beaufort, 1913, Fishes Indo-Austr. Arch., 2: 103; (?) Misra, 1950, Rec. Indian Mus., 45: 408; (?) 1953, op. cit., 50: 390; Parr, 1952, Bull. Mus. Comp. Zool., 107: 267.

Deep-abyssal record.—Western Pacific, 3932 meters, the type.

Distribution.—Western Pacific, one deep-abyssal record. (?) Indian Ocean, Andaman Sea, one damaged specimen, depth of capture not known.

Length.—229 mm.

Bathytroctes inspector Garman

Bathytroctes inspector Garman, 1899, Mem. Mus. Comp. Zool., 24: 288, pl. M, fig. 1—Pacific off Panama, ca. 6° N., 83° W.

Bathytroctes inspector Parr, 1952, Bull. Mus. Comp. Zool., 107: 266.

Deep-abyssal record and distribution.—Eastern Pacific, 2690 meters, one(?) specimen.

Length.—254 mm.

Bathytroctes alvifrons Garman

Bathytroctes alvifrons Garman, 1899, Mem. Mus. Comp. Zool., 24: 286, pl. 58, fig. 2—Pacific off Panama and the Galapagos Islands, ca. 6° N., 80° W. and ca. 2° N., 92° W. (type locality not designated).

Bathytroctes alvifrons Parr, 1952, Bull. Mus. Comp. Zool., 107: 267.

Deep-abyssal records and distribution.—Eastern Pacific, 3279, 2488 meters, an unstated number of specimens from two hauls.

Length.—?—ca. 229 mm.

Bathytroctes koefoedi Parr

Bathytroctes koefoedi Parr, 1951, Amer. Mus. Nov., 1531: 11—Atlantic, ca. 34° N., 33° W.

Bathytroctes alvifrons Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 45.

Bathytroctes koefoedi Parr, 1952, Bull. Mus. Comp. Zool., 107: 267.

Deep-abyssal record and distribution.—Eastern Atlantic, 2865 meters, nineteen specimens in one haul.

Length.—105–400 mm.

Bathytroctes michaelsarsi Koefoed

Bathytroctes michaelsarsi Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 48, pl. 3, fig. 9—Atlantic, ca. 34° N., 33° W.

Bathytroctes michaelsarsi Parr, 1952, Bull. Mus. Comp. Zool., 107: 266.

Deep-abyssal record and distribution.—Eastern Atlantic, 2865 meters, four specimens in one haul.

Length.—260–420 mm.

Bajacalifornia drakei Beebe

Bathytroctes drakei Beebe, 1929, *Zoologica*, **12**: 6—off New York, 1463 meters.

Bathytroctes drakei Beebe, 1933, op. cit., **16**: 10, 23, figs. 2-5; 1937, op. cit., **22**: 198.

Bajacalifornia drakei Parr, 1937, *Bull. Bingham Oceanogr. Coll.*, **3**, (7), pp. 11, 24, figs. 1, 8; 1952, *Bull. Mus. Comp. Zool.*, **107**: 265.

Deep-abyssal record.—Western Atlantic off the Bahamas, 2012 meters, one specimen doubtfully assigned to this species.

Distribution.—Western Atlantic off New York, Bermuda, and the Bahamas, one deep-abyssal record and twenty-seven juvenile specimens in 732-1645 meters.

Length.—10-68 mm. (without caudal).

Grimatroctes grimaldii Zugmayer

Bathytroctes Grimaldii Zugmayer, 1911, *Bull. Inst. Océanogr. Monaco*, **193**: 1—Atlantic, ca. 37° N., 10° W.

Bathytroctes Grimaldii Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, **35**: 6, pl. 1, fig. 2; Lozano Rey, 1947, *Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat.*, **11**: 73, pl. 3, fig. 2; Belloc, 1949, *Bull. Inst. Océanogr. Monaco*, **958**: 5.

Grimatroctes grimaldii Parr, 1952, *Bull. Mus. Comp. Zool.*, **107**: 266.

Deep-abyssal record and distribution.—Eastern Atlantic, 4900 meters, one specimen caught in a pelagic net.

Length.—165 mm.

Grimatroctes microlepis Günther

Bathytroctes microlepis Günther, 1878, *Ann. Mag. Nat. Hist.*, (5), **2**: 249—Atlantic off Portugal, ca. 35° N., 8° W.

Bathytroctes microlepis Günther, 1887, *Rep. Sci. Res. Voy. Challenger, Zool.*, **22**: 226, pl. 57, fig. A; Goode and Bean, 1895, *Ocean. Ichth.*, p. 42; Roule, 1935, *Bull. Inst. Océanogr. Monaco*, **674**: 4; Nobre, 1935, *Fauna Mar. Portugal*, **1**: 519; Lozano Rey, 1947, *Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat.*, **11**: 76, fig. 11.

Grimatroctes microlepis Parr, 1952, *Bull. Mus. Comp. Zool.*, **107**: 266.

Deep-abyssal record and distribution.—Eastern Atlantic, 1992 meters, one specimen.

Length.—254 mm.

Remarks.—Roule (1935, p. 4) reported a somewhat damaged specimen taken from the stomach of a tuna caught at Madeira, and Alcock (1899, p. 174) doubtfully identified as this species a mutilated fish from a depth of 914 meters in the Andaman Sea.

Narcetes pappenheimi Fowler

Narcetes pappenheimi Fowler, 1934, Proc. Acad. Nat. Sci. Philadelphia, 85: 253, fig. 15—Gulf of Tomini, Celebes.

Deep-abyssal record and distribution.—Western Pacific, 1997 meters, one specimen.

Length.—128 mm.

Narcetes stomias Gilbert

Bathytroctes stomias Gilbert, 1890, Proc. U. S. Nat. Mus., 13: 53—Pacific off Oregon, ca. 47° N., 125° W., 1604 meters.

Bathytroctes stomias Goode and Bean, 1895, Ocean. Ichth., p. 40; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 454.

Narcetes stomias Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 10.

Deep-abyssal record.—Eastern Pacific off San Diego, 1968 meters, one specimen.

Distribution.—Eastern Pacific off San Diego and Oregon, one deep-abyssal specimen and one in 1604 meters.

Length.—330–381 mm.

Remarks.—An examination of two specimens of *Narcetes* captured recently at a depth of 2104–2194 meters in the Gulf of Mexico suggests that *N. affinis*, *N. pluriserialis*, and the two eastern Atlantic specimens recorded by Koefoed (1927, p. 54) under the name *pluriserialis* are probably synonyms of *N. stomias*. The new specimens will be described in detail later. Koefoed's examples were taken in ca. 35° N., 8° W., in 2055 meters and ca. 50° N., 11° W., in 1797 meters.

Narcetes pluriserialis Garman

Narcetes pluriserialis Garman, 1899, Mem. Mus. Comp. Zool., 24: 289, pl. 57, fig. 3—Pacific off Panama, ca. 5° N., 86° W., 1847 meters.

Deep-abyssal record and distribution.—Eastern Pacific off Panama, 1847 meters, an unstated number of specimens from one haul.

Length.—Ca. 432 mm.

Narcetes affinis Lloyd

Narcetes affinis Lloyd, 1906, Ann. Mag. Nat. Hist., (7), 18: 308—Gulf of Oman, Indian Ocean.

Narcetes affinis Annandale and Lloyd, 1908, Ill. Zool. Investigator, Fishes, pl. 42, figs. 1, 1, a; Lloyd, 1909, Mem. Indian Mus., 2: 149; Misra, 1950, Rec. Indian Mus., 45: 408; 1953, op. cit., 50: 391.

Deep-abysal record and distribution.—North Indian Ocean, 1839 meters, one specimen.

Length.—356 mm.

***Bellochia vaillanti* Parr**

Bellochia vaillanti Parr, 1951, Amer. Mus. Nov., 1531: 6, 12—off Morocco, *Talisman* Station 28.¹

Bathytroctes melanocephalus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pl. 11, fig. 3 (not description on p. 155); Bertin, 1940, Bull. Mus. Hist. Nat. Paris, 12: 274 (part).

Deep-abysal record and distribution.—Eastern Atlantic, 2600 meters, one specimen (see discussion on p. 118).

Length.—104.5 mm. (without caudal).

***Leptochilichthys macrops* Roule and Angel**

Leptochilichthys Agassizii macrops Roule and Angel, 1931, Bull. Inst. Océanogr. Monaco, 581: 6—Atlantic off Morocco, ca. 34° N., 10° W.

Leptochilichthys Agassizii macrops Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 8, pl. 1, fig. 3; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 5.

Leptochilichthys macrops Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1162, fig. 490.

Deep-abysal record and distribution.—Eastern Atlantic, 3000 meters, one specimen taken in a pelagic net.

Length.—275 mm.

Remarks.—Closely related to the following species.

***Leptochilichthys agassizi* Garman**

Leptochilichthys Agassizii Garman, 1899, Mem. Mus. Comp. Zool., 24: 285, pl. 58, fig. 3—Pacific off Ecuador, ca. 1° N., 80° W.

Deep-abysal record and distribution.—Eastern Pacific, 2877 meters, one(?) specimen.

Length.—305 mm.

¹ Sanderson Smith (1888, p. 980) published a list of the dredgings made by the French ships *Travailleur* in 1880–81 and *Talisman* in 1883. It has been found that the data therein rarely agree with that given by Vaillant (1888). For instance, Bertin (1940, p. 275) stated that the type of *Bathytroctes attritus* Vaillant was from *Talisman* Station 121. Both he and Vaillant cite this locality as south of the Azores in 1442 meters, but Smith's data for the station are as follows: 16° 52' N., 25° 12' W., depth 508 meters, Cape Verde Islands. For the same species Vaillant lists Station 100, Banc d'Arguin, 1550 meters, while Smith lists the depth of Station 100 as 2324 meters. Similar contradictions are found more or less consistently. In view of these discrepancies, and since the original *Talisman* station records are not at hand, exact type localities cannot be given for Vaillant's fishes.

Rouleina attritus Vaillant

Bathytrocles attritus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 158, pl. 12, fig. 2—Atlantic south of the Azores, *Talisman* Station 121, 1442 meters (see footnote, p. 110).

Bathytrocles attritus Goode and Bean, 1895, Ocean. Ichth., p. 45; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 129; Bertin, 1940, Bull. Mus. Hist. Nat. Paris, 12: 275.

Bathytrocles mollis Koehler, 1896, Ann. Univ. Lyon, 26: 517, pl. 26, fig. 2; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 189, fig. 77; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 80, fig. 13.

Talismania mollis Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 11; 1919, Rés. Camp. Sci. Monaco, 52: 6, pl. 1, fig. 1; 1927, Bull. Inst. Océanogr. Monaco, 497: 2; 1934, Poiss. Monde Viv. Eaux, 7: 151, pl. 6, text fig.; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 55, pl. 3, fig. 5.

Caudania mollis Roule, 1935, Bull. Inst. Océanogr. Monaco, 674: 2; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 9, pl. 1, fig. 2, text fig. 3.

Alepocephalus rostratus Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 185 (part).

Rouleina attritus Parr, 1951, Amer. Mus. Nov., 1531: 13.

Deep-abyssal records.—Eastern Atlantic off Cape Verde, 3655 meters, one specimen.

Eastern Atlantic, ca. 35° N., 8° W., 2055 meters, eleven specimens.

Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 meters, one specimen.

Distribution.—Eastern Atlantic only, 16°–38° N., 4°–26° W., twenty-six specimens, thirteen in deep-abyssal waters and thirteen in 1442–1805 meters. Said to be not rare at Madeira, depth unknown (Roule, 1927, p. 2).

Length.—130–460 mm.

Rouleina danae Parr

Rouleina danae Parr, 1951, Amer. Mus. Nov., 1531: 14—Pacific, ca. 8° N., 119° E.

Deep-abyssal record and distribution.—Western Pacific, Sulu Sea, ?2500 meters, one specimen, 4000 meters of wire out, depth to bottom 2775 meters. Probably caught on or near bottom.

Length.—108 mm. (without caudal).

Rouleina guentheri Alcock

Xenodermichthys Guentheri Alcock, 1892, Ann. Mag. Nat. Hist., (6), 10: 359, pl. 18, fig. 3—Bay of Bengal, 1240 meters.

Xenodermichthys guntheri (*guentheri* of authors) Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 180; Alcock and McArdle, 1900, Ill. Zool. Investigator, Fishes, pl. 32, fig. 2; McArdle, 1901, Ann. Mag. Nat. Hist., (7), 8: 518; Misra, 1950, Rec. Indian Mus., 45: 409; 1953, op. cit., 50: 391, fig. 12, b.

Rouleina guntheri Norman, 1930, Disc. Rep., 2: 271; 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 15; Parr, 1951, Amer. Mus. Nov., 1531: 18.

Deep-abyssal records.—Indian Ocean, ca. 10° N., 74° E., 2104–2140 meters, (?)specimens.

Indian Ocean, ca. 7° N., 76° E., 1840 meters, (?)specimens.

Distribution.—Indian Ocean, Bay of Bengal, Arabian Sea and Gulf of Aden, two deep-abyssal records and at least six specimens in 786–1410 meters.

Length.—110–152 mm.

***Asquamiceps velaris* Zugmayer**

Asquamiceps velaris Zugmayer, 1911, Bull. Inst. Océanogr. Monaco, 193: 2—Atlantic, ca. 36° N., 9° W.

Asquamiceps velaris Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 10, pl. 1, fig. 4; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 186, fig. 75; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 82, pl. 3, fig. 4; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 5.

Asquamiceps (*Asquamiceps*) *velaris* Parr, 1954, Amer. Mus. Nov., 1655: 4.

Deep-abyssal record and distribution.—Eastern Atlantic, 3660 meters, one specimen, in a pelagic net.

Length.—175 mm.

***Asquamiceps indagatio* Parr**

Asquamiceps (*Asquamiceps*) *indagatio* Parr, 1954, Amer. Mus. Nov., 1655: 4, 5—Atlantic off South Africa, ca. 34° S., 16° E.

Asquamiceps velaris Norman, 1930, Disc. Rep., 2: 267.

Deep-abyssal record and distribution.—Atlantic off South Africa, 2580 meters, one specimen taken in a closing net.

Length.—90 mm. (without caudal).

***Asquamiceps pacificus* Parr**

Asquamiceps (*Perioceps*) *pacificus* Parr, 1954, Amer. Mus. Nov., 1655: 4, 6—Gulf of Panama, ca. 6° N., 80° W.

Deep-abyssal record and distribution.—Eastern Pacific, 2200 meters, one specimen taken in a pelagic net, with 3500 meters of wire out. Depth to bottom not known.

Length.—85 mm. (without caudal).

Brunichthys asperifrons Garman

Alepocephalus asperifrons Garman, 1899, Mem. Mus. Comp. Zool., 24: 291, pl. 59, fig. 1—Pacific off Panama, 6°–7° N., 79°–81° W. (type locality not designated).

Brunichthys asperifrons Parr, 1951, Amer. Mus. Nov., 1531: 8.

Deep-abyssal record.—Eastern Pacific, 1865 meters, one haul.

Distribution.—Eastern Pacific, one deep-abyssal record and one haul in 1430 meters.

Length.—?–305 mm.

Leptoderma macrops Vaillant

Leptoderma macrops Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 31, 166, pl. 13, fig. 2—Atlantic between the Canary Islands and Morocco, *Talisman* Station 47 (see footnote, p. 110).

Leptoderma macrops Goode and Bean, 1895, Ocean. Ichth., p. 49, fig. 56; Koehler, 1896, Ann. Univ. Lyon, 26: 523; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 8; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 193, fig. 82; Bertin, 1940, Bull. Mus. Hist. Nat. Paris, 12: 275; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 92, fig. 17; Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 183, figs. 9–13.

Deep-abyssal record.—Eastern Atlantic off North Africa, 2330 meters, one specimen.

Distribution.—Eastern Atlantic only, off North Africa, the Canary Islands and in the Gulf of Gascony, at least sixty-three specimens, one from deep-abyssal waters and the rest in 800–1804 meters. Center of distribution probably between 1000 and 2000 meters.

Length.—85 (standard)–195 mm.

Aulastomatomorpha phosphorops Alcock

Aulastomatomorpha phosphorops Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 307—Indian Ocean, ca. 11° N., 74° E., 1829 meters.

Aulastomatomorpha phosphorops Alcock, 1891, Ann. Mag. Nat. Hist., (6), 7: 10, fig. 1; 1892, Ill. Zool. Investigator, Fishes, pl. 5, fig. 2; Goode and Bean, 1895, Ocean. Ichth., p. 50, fig. 55; Lloyd, 1906, Ann. Mag. Nat. Hist., (7), 18: 306, fig.; 1909, Mem. Indian Mus., 2: 148; Misra, 1950, Rec. Indian Mus., 45: 410; 1953, op. cit., 50: 393, fig. 14, b.

Aulastomatomorpha phosphorops Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 178; 1902, Nat. Indian Seas, p. 239, fig. 40.

Deep-abyssal records and distribution.—Bay of Bengal, 2012 meters, one specimen.

Arabian Sea, 1829 meters, one specimen.

Length.—279 mm.

Aulastomatomorpha caeruleiceps Lloyd

Aulastomatomorpha caeruleiceps Lloyd, 1906, Ann. Mag. Nat. Hist., (7), 18: 308—Gulf of Oman.

Aulastomatomorpha caeruleiceps Annandale and Lloyd, 1908, Ill. Zool. Investigator, Fishes, pl. 42, fig. 3.

Aulastomatomorpha caeruleiceps Lloyd, 1909, Mem. Indian Mus., 2: 148.

Deep-abyssal record and distribution.—Arabian Sea, 1839 meters, one specimen.

Length.—180 mm.

Conocara weneri Nybelin

Conocara weneri Nybelin, 1946, Ark. Zool., 38B, (2), p. 1, fig. 1—Atlantic, ca. 35° N., 8° W.

Conocara weneri Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 5, pl. 1, fig. 1.

Deep-abyssal record and distribution.—Eastern Atlantic, 2150–2300 meters, one specimen.

Length.—380 mm.

Conocara macroptera Vaillant

Alepocephalus macropterus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 150, pl. 11, fig. 2—North Africa, Banc d'Arguin, 1550 meters, *Talisman* Station 100 (see footnote, p. 110).

Conocara macroptera Goode and Bean, 1895, Ocean. Ichth., p. 39, fig. 43; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 458; Murray and Hjort, 1912, Depths of Ocean, p. 394, fig. 263; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 5; Roule and Angel, 1933, op. cit., 86: 5; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 190, 1163, fig. 79; ?Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 10, fig. 1; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 90, pl. 4, fig. 1; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 8.

Alepocephalus macropterus Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; 1908, Rep. Fish. Ireland 1906, Sci. Invest., 5: 42, pl. 5, fig. 1; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 40, pl. 1, fig. 1.

Alepocephalus (Conocara) macroptera Bertin, 1940, Bull. Mus. Hist. Nat. Paris, 12: 273.

Deep-abyssal records.—Eastern Atlantic off Morocco, 2055–2115 meters, ten specimens from three hauls.

Distribution.—Eastern Atlantic, 28°–51° N., 7°–28° W., ten specimens from deep-abyssal waters and twenty-four in 865–1805 meters. Western Atlantic in ca. 16° N., 63° W. and off the Bahamas

(a doubtful identification), two specimens, 1257–1729 meters. Reaching deep-abyssal waters but with the maximum occurrence probably in 1400–1800 meters.

Length.—69 (standard) and 160–330 mm.

Conocara murrayi Koefoed

Alepocephalus murrayi Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 41, pl. 3, fig. 6, text figs. 9, 10—Atlantic, ca. 35° N., 8° W., 2055 meters.

Deep-abyssal records and distribution.—Eastern Atlantic, ca. 35° N., 8° W., 2603 meters, two specimens.

Eastern Atlantic, ca. 27° N., 14° W., 2055 meters, one specimen.

Western Atlantic, Gulf of Mexico, 2104–2194 meters, one specimen (*Oregon Station 1303*, 28° 47' N., 87° 50' W., May 26, 1955).

Length.—157 mm. (without caudal) and 230–290 mm.

Ericara salmonea Gill and Townsend

Ericara salmonea Gill and Townsend, 1897, Proc. Biol. Soc. Washington, 11: 232—Bering Sea, ca. 55° N., 170° W.

Ericara salmonea Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2816; Parr, 1951, Amer. Mus. Nov., 1531: 15.

Xenognathus profundorum Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 311, pl. 14.

Deep-abyssal records and distribution.—North Pacific, 3239 meters, the type.

Eastern Pacific off Catalina Island, 2469–3991 meters, one specimen.

Length.—? and 525 mm.

Ericara niger Günther

Alepocephalus niger Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 248—Pacific north of Australia, ca. 12° S., 145° E.

Alepocephalus niger Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 224, pl. 56, fig. B; Goode and Bean, 1895, Ocean. Ichth., pp. 36, 38, fig. 42.

Whitleydea niger Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), pp. 6, 9, 12.

Ericara niger Parr, 1951, Amer. Mus. Nov., 1531: 15.

Deep-abyssal record and distribution.—Western Pacific, 2560 meters, one specimen.

Length.—330 mm.

Einara macrolepis Koefoed

Alepocephalus macrolepis Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 44, pl. 3, fig. 8, text figs. 12, 13—Atlantic, ca. 28° N., 24° W.

Alepocephalus sp. Murray and Hjort, 1912, Depths of Ocean, p. 412.

Asquamiceps macrolepis Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 12.

Einara macrolepis Parr, 1951, Amer. Mus. Nov., 1531: 10.

Deep-abyssal record and distribution.—Eastern Atlantic, 4000 meters, one specimen caught in a pelagic net. Depth to bottom 5000 meters.

Length.—200 mm.

Family SEARSIIDAE

Mirorictus taningi Parr

Mirorictus taningi Parr, 1947, Copeia, p. 60, fig. 1—Gulf of Panama.

Deep-abyssal record and distribution.—Eastern Pacific, ?2200 meters, one specimen taken in a pelagic net, with 3500 meters of wire out. Depth to bottom not known.

Length.—137 mm.

Platyroctes apus Günther

Platyroctes apus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 249—Atlantic, ca. 1° N., 26° W., 2744 meters.

Platyroctes apus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 229, pl. 58, fig. A; Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 307; 1891, op. cit., (6), 7: 11; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 177; Goode and Bean, 1895, Ocean. Ichth., p. 46, fig. 53; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 458; Lloyd, 1909, Mem. Indian Mus., 2: 146; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 8; Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 12; 1919, Rés. Camp. Sci. Monaco, 52: 14, pl. 1, fig. 4; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 58; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 191, fig. 80; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 85, fig. 15; Misra, 1950, Rec. Indian Mus., 45: 409; 1953, op. cit., 50: 391.

?*Platyroctes procerus* Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 23, fig. 3; 1908, op. cit., 15, (2), p. 192.

Deep-abyssal records.—Mid-Atlantic east of the mid-Atlantic ridge, 2744 meters, the type.

Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, one specimen.

?Eastern Atlantic off the Cape Verde Islands, 2500 meters, one specimen, pelagic.

Eastern Atlantic, ca. 37° N., 10° W., 4900 meters, one specimen taken in mid-water together with other pelagic fishes.

Distribution.—Eastern Atlantic from ca. 37° N., 10° W. to the Cape Verde Islands, three specimens from deep-abyssal waters and one in 1786 meters (ca. 27° N., 17° W.). Mid-Atlantic, one deep-abyssal record. Indian Ocean, Arabian Sea, one specimen, 1353 meters.

Length.—33 mm. and 108–190 mm.

Remarks.—The type and only known specimen of *P. procerus*, thought to be the young of *P. apus*, was only 33 mm. long and was caught pelagically in a net hauled in 2500 meters off the Cape Verde Islands. Another example taken in mid-water was 150 mm. in standard length, suggesting that the species may be pelagic when adult also.

Holtbyrnia melanocephalus Vaillant

Bathytroctes melanocephalus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 155 (not pl. 11, fig. 3)—Atlantic off North Africa (see footnote, p. 110).

?*Bathytroctes innesi* Fowler, 1934, Proc. Acad. Nat. Sci. Philadelphia, 85: 252, fig. 14.

Bathytroctes melanocephalus Nobre, 1935, Fauna Marinha Portugal, 1: 519; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 188; Bertin, 1940, Bull. Mus. Hist. Nat. Paris, 12: 274; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 78, fig. 12.

?*Holtbyrnia innesi* Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 6; 1951, Amer. Mus. Nov., 1531: 12.

Holtbyrnia melanocephalus Parr, 1951, loc. cit.

Deep-abyssal record.—?Western Atlantic, ca. 38° N., 70° W., 3205 meters, one specimen (*innesi*).

Distribution.—?Western Atlantic, one deep-abyssal record. Eastern Atlantic, see below.

Length.—195–225 mm.

Remarks.—Vaillant (1888, p. 157) reported four specimens taken off Morocco and Soudan at depths of 1435 meters (*Talisman* Station 78), 1617 meters (Station 99), 2200 meters (Station 39) and 2600 meters (Station 28). Bertin (1940, p. 274) reported that only two specimens now remain in the Paris museum, those from stations 99 and 28. To the first of these specimens is attached the number given the type by Vaillant (no. 85–167), but since it measures 225

mm., whereas Vaillant gave the length as 108 mm., Bertin concluded that Vaillant must by error have placed the number on a different specimen and that the type is no longer in the museum. Parr (1951, p. 12), who examined these two specimens, reported that the one bearing the number of the type agrees with the original description but the second specimen differs and has been made the type of a new genus and species, *Bellocia vaillanti* (family Alepocephalidae). It is now impossible to know to which species belonged the examples from stations 78 and 39.

Searsia polycoeca Parr

Searsia polycoeca Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), pp. 11, 15, 19, figs. 1, 5—near Bermuda.

Holbyrnia (Mentodus) polycoeca Parr, 1951, Amer. Mus. Nov., 1531: 16; Maul, 1954, Bol. Mus. Mun. Funchal, 7, (17), p. 41, figs. 14–16.

Searsia polycoeca Krefft, 1953, Zool. Anz., 151: 264; Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 201, 202.

Deep-abyssal record.—Western Atlantic, 2012 meters, the type.

Distribution.—Eastern Atlantic, ca. 10° N., 21° W., one specimen, 400–875 meters, closing net; and one from the stomach of an *Aphanopus carbo* taken in deep water at Madeira. Western Atlantic, one deep-abyssal record.

Length.—48–148 mm. (without caudal).

Remarks.—The species is apparently bathypelagic and probably is not an inhabitant of deep-abyssal waters.

Pellisulus facilis Parr

Pellisulus facilis Parr, 1951, Amer. Mus. Nov., 1531: 18, 19—Gulf of Panama, ca. 6° N., 80° W.

Pellisulus facilis Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 206.

Deep-abyssal record and distribution.—Eastern Pacific, ?2300 meters, one specimen taken in a pelagic net, with 3600 meters of wire out. Depth to bottom not known.

Length.—98 mm. (without caudal).

Remarks.—The British Museum collection contains an example of this species but details of its origin have not been published.

Barbantus curvifrons Roule and Angel

Bathytroctes curvifrons Roule and Angel, 1931, Bull. Inst. Océanogr. Monaco, 581: 6—Gulf of Gascony, ca. 46° N., 10° W.

Bathytroctes curvifrons Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 6, pl. 1, fig. 2; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 74, pl. 3, fig. 3; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 5.

Barbantus curvifrons Parr, 1951, Amer. Mus. Nov., 1531: 18.

Deep-abyssal record and distribution.—Eastern Atlantic, 4500 meters, one specimen caught in a pelagic net.

Length.—105 mm.

Family GONOSTOMATIDAE

Apparently all members of this cosmopolitan family are bathypelagic, some being quite abundant at levels higher than those under consideration here. The wide vertical ranges shown by some species are partly due to the fact that many gonostomatid fishes, or their young, make daily vertical migrations and are found in shallower water at night, and partly because some species live at higher levels when young. Unfortunately, it has not been possible to evaluate either the day and night distribution or the ontogenetic migrations of the species discussed below.

Gonostoma denudatum Rafinesque has been omitted, although Norman (1930, p. 282) reported one specimen from a closing net hauled in 2500–2700 meters (eastern Atlantic, ca. 5° N., 17° W.). The species appears to be fairly common above 500 meters, the only deeper records being one specimen at 1180 and three at 2000 meters.

Gonostoma elongatum Günther has also been omitted, although it may occasionally reach the deep-abyssal zone. Its center of distribution seems to be higher.

Gonostoma bathyphilum Vaillant. Table 2.

Neostoma bathyphilum Vaillant, *1884, Nature, Paris, 22: 184, fig.—Gulf of Gascony, *Talisman* Station 140 (see footnote on p. 110).

Neostoma bathyphilum Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 96, pl. 8, fig. 1.

Cyclothone bathyphila Goode and Bean, 1895, Ocean. Ichth., p. 100, fig. 118; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 582; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 227, fig. 103.

Cyclothone grandis Collett, 1896, Bull. Soc. Zool. France, 21: 99; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 24; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 229; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 8.

Gonostoma bathyphilum Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 73; Holt and Byrne, 1906, Rep. Fish. Ireland 1905,

Sci. Invest., 2: 22; 1907, Trans. Linn. Soc. London, (2), 10, Zool., p. 194; 1913, Rep. Fish. Ireland 1912, Sci. Invest., 1: 11, figs. 3, 4; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 49, pl. 2, fig. 1; Roule, 1919, op. cit., 52: 27; Vaillant, in Roule, 1919, op. cit., p. 130; Nusbaum-Hilarowicz, 1923, op. cit., 65: 17, 77, pl. 3, figs. 3-6, 8; Roule and Angel, 1923, Bull. Inst. Océanogr. Monaco, 429: 4; Norman, 1930, Disc. Rep., 2: 285; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 79; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 5; 1937, op. cit., 3, (7), p. 41, fig. 17; Beebe, 1937, Zoologica, 22: 201; Bertin, 1939, Bull. Mus. Hist. Nat. Paris, (2), 11: 378; 1940, op. cit., 12: 312; Schroeder, 1940, Copeia, p. 232; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 161, figs. 37, 38; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 18; Smith, 1949, Sea Fishes So. Afr., p. 104, fig. 151; Marshall, 1951, Jour. Mar. Res., 10: 3; 1954, Aspects Deep Sea Biol., pp. 209, 224, 291-292, figs. viii-12, ix-4; Grey, 1955, Fieldiana, Zool., 37: 272.

Gonostoma grande Murray and Hjort, 1912, Depths of Ocean, pp. 101, 604, 612, 618, 625, 627, 628, 664, 665, 702, 720, 739, 744, pl. 2, text figs. 477, 490, 535; Nusbaum-Hilarowicz, 1923, Rés. Camp. Sci. Monaco, 65: 18, 77, pl. 2, figs. 25, 26, pl. 3, fig. 7, pl. 10, figs. 12-18; Zugmayer, in Roule and Angel, 1933, op. cit., 86: 79.

Gonostoma grandis Barnard, 1925, Ann. So. Afr. Mus., 21: 143.

?*Gonostoma* sp. Roule and Angel, 1930, Rés. Camp. Sci. Monaco, 79: 25.

Distribution.—Atlantic from ca. 56° N., to South Africa (ca. 34° S.) in the east and from ca. 43° N. to 17° N. in the west. Probably a deep-abyssal inhabitant. Depth range 650-5100 meters.

Of more than 130 recorded specimens, at least seventy-five were caught in deep-abyssal waters. There are four closing net records, two in the Gulf of Gascony in 2744-2286 meters (one, 110 mm.) and 2744-1372 meters (one, 85 mm.) and two off South Africa in 1410-1310 meters (three, 80-130 mm.) and 950-850 meters (one, 60 mm.).

Length.—29-180 mm.

Remarks.—Available evidence suggests that older specimens live principally below 2000 meters. Of the examples from shallower water, only three of the twenty-eight whose lengths were given exceeded 100 mm. (120, 130, 165 mm.), whereas below 2000 meters, of the seventeen specimens of known length twelve were between 100 and 180 mm. Only a few authors included the lengths of their specimens.

Cyclothone livida Brauer. Table 3.

Cyclothone livida Brauer, 1902, Zool. Anz., 25: 279—eastern Atlantic, ca. 9° S., 9° E., 2000 meters.

Cyclothone livida Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 80, pl. 6, fig. 5, text fig. 31; Murray and Hjort, 1912, Depths of Ocean, pp. 612, 676, fig. 493; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-03, 15, Zool., 7: 178; Barnard, 1925, Ann. So. Afr. Mus., 21: 145; Norman, 1930, Disc. Rep., 2: 287; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 224, fig. 102; Smith, 1949, Sea Fishes So. Afr., p. 103; Marshall, 1951, Jour. Mar. Res., 10: 3.

Distribution.—Eastern and south Atlantic from 28° N. to 28° S., 11° E. to 29° W. and in ca. 35° S., 2° E. At least 251 specimens recorded from twenty-five hauls, of which only six were made above 2000 meters. Extreme range 500–4972 meters.

Brauer did not record the number of specimens per haul, but he did state that of 141 specimens only two were caught above a depth of about 1200 meters. A review of the *Valdivia* stations shows that only three stations were above 2000 meters, one in 600, one in 1200, and one in 1500 meters. Brauer noted that at one station in the Gulf of Guinea thirty specimens were caught in a vertical haul from 3000 meters, while a net on the same line, lowered to only 700 meters, contained no specimens.

On the evidence of the *Valdivia* catches alone the species would be considered almost restricted to deep-abyssal waters, but both Pappenheim (1914, p. 178) and Norman (1930, p. 287) reported it in some abundance up to 800 meters. However, the total number of specimens known from above 2000 meters is only ninety-seven (not including the *Valdivia* haul in 1500 meters, number of specimens unknown) and thus most of the known examples were caught below that depth.

Length.—9–60 mm.

Remarks.—There is little relationship between size and depth of capture on the basis of known facts, although the shallowest catch, in 500 meters, consisted of two examples only 18–19 mm. long (Pappenheim, 1914). The largest specimen reported, 60 mm., was caught in a haul from 3000 meters, together with nine others, including six “very young” (op. cit.). Norman (1930) recorded ninety specimens ranging in standard length from 20 to 53 mm., in four hauls made in 800–1200 meters. Brauer (1906) gave the length of the *Valdivia* specimens as 9–39 mm. (without caudal) but did not specify the size of the two examples from 600 meters.

***Cyclothone microdon* Günther. Tables 4, 5.**

Gonostoma microdon Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 187—type locality not designated.

- Cyclothone lusca* Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 221; Jordan, 1887, Rep. U. S. Fish Comm., 1885: 834; Gilbert, 1891, Proc. U. S. Nat. Mus., 13: 449.
- Gonostoma microdon* Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 175; Alcock, 1889, Ann. Mag. Nat. Hist., (6), 4: 399; 1890, op. cit., (6), 6: 222; Holt and Byrne, 1907, Trans. Linn. Soc. London, (2), 10, Zool., p. 194.
- Neostoma quadrioculatum* Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 99, pl. 8, fig. 2.
- Gonostoma (Cyclothone) microdon* Lütken, *1891, Vidensk. Medd. Dansk naturh. Foren., 1891: 216; 1892, Vidensk. Selsk. Skr. naturv. Math. Afhandl., 7: 280, pl. 2, figs. 4, 5; Holt and Byrne, 1904, Ann. Mag. Nat. Hist., (7), 14: 37, 39.
- Cyclothone microdon* Goode and Bean, 1895, Ocean. Ichth., pp. 99, 514, fig. 114; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 582; Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 402, 465; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 130; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 441; Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 141; Lo Bianco, *1901, Mitt. Zool. Stat. Neapel, 15: 413; *1903, op. cit., 16: 109; 1904, Pelag. Tiefsee-fische Maja, 1: 20 (part), pl. 2, fig. 4; 1909, Mitt. Zool. Stat. Neapel, 19: 714; Ehrenbaum, 1902, Fauna Arct., Fische, 2: 136; Woltereck, 1904, Zool. Jahrb., 7, Suppl., p. 347; Lönnberg, 1905, Wiss. Ergebn. Schwed. Südpol Exp., 5, (6), p. 65; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 22; 1913, Rep. Fish. Ireland 1912, Sci. Invest., 1: 12, fig. 5; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 82, pl. 6, fig. 4, text fig. 32; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 271; Mazzarelli, *1909, Riv. Mens. Pesc. Idrobiol., 4, (11); *1910, op. cit., 5, (10-12); Fage, 1910, Ann. Inst. Océanogr. Paris, 1, (7), p. 6; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 43; in Roule and Angel, 1933, op. cit., 86: 80; Gilbert and Burke, 1912, Bull. Bur. Fish., 30: 35; Murray and Hjort, 1912, Depths of Ocean, pp. 86, 101-103, 108, 118, 126, 604, 612, 618, 622, 624-627, 659, 664, 665, 676, 677, 681, 699, 718, 739-741, 771, pl. 1, text figs. 473, 474, 476, 493, 528, 530, c; Weber, 1913, Monogr. Siboga Exp., 57: 18; Weber and de Beaufort, 1913, Fishes Indo-Austr. Arch., 2: 126, fig. 46; Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 232; 1916, Rep. Brit. Antarctic (Terra Nova) Exp. 1910, Zool., 1: 137, pl. 5, fig. 5; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-1903, 15, Zool., 7: 178; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 27; Vaillant, in Roule, 1919, op. cit., p. 130; Jespersen and Tåning, 1919, Vidensk. Medd. Dansk naturh. Foren., 70: 217; 1926, Rep. Danish Oceanogr. Exp. 1908-1910, 2, (A 12), p. 7; Roule and Angel, 1921, Bull. Inst. Océanogr. Monaco, 397: 2; 1924, op. cit., 451: 3; 1930, Rés. Camp. Sci. Monaco, 79: 26, pl. 2, fig. 28; Barnard, 1925, Ann. So. Afr. Mus., 21: 146; Breder, 1927, Bull. Bingham Oceanogr. Coll., 1, (1), p. 44; Beebe, 1929, Zoologica, 12: 13; 1933, Proc. Nat. Acad. Sci., Washington, 19: 180; 1937, Zoologica, 22: 201; Norman, 1930, Disc. Rep., 2: 287; 1937, Rep. B.A.N.Z. Antarctic Res. Exp. 1929-1931, 1: 82; Angel and Verrier, 1931, Ann. Inst. Océanogr. Paris, 10: 123; Gregory, 1933, Trans. Amer. Phil. Soc., 23: 161, fig. 54; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4,

(6), pp. 5, 11, figs. 3, 12, 13; 1937, op. cit., 3, (7), p. 44; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 225, 1204; Belloc, 1938, Rev. Trav. Pêches Marit., 11, (3), p. 285, fig. 5; Bertin, 1939, Bull. Mus. Hist. Nat. Paris, 11: 378; 1940, op. cit., 12: 312; Chapman, 1940, Occ. Pap. British Columbia Prov. Mus., 2: 11; Longley and Hildebrand, 1941, Publ. Carnegie Inst. Washington, 535: 15; Tortonese, 1941, Riv. Sci. Nat. Natura, 32: 76; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 105, fig. 53; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 167, pl. 5, fig. 1, text fig. 41; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 20, pl. 3, fig. 1; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 107, chart 7; Smith, 1949, Sea Fishes So. Afr., p. 103, fig. 149; Schmidt, 1950, Akad. Sci. U.S.S.R. Trans. Pac. Comm., 6: 54; Misra, 1950, Rec. Indian Mus., 45: 413; 1953, op. cit., 50: 398; Marshall, 1951, Jour. Mar. Res., 10: 3, 8, 11; 1954, Aspects Deep Sea Biol., pp. 109, 223, figs. v-14, ix-4; Koumans, 1953, Temminckia, 9: 182; Günther and Deckert, *1953, Z. Morph. Ökol., 42: 1; Mukhacheva, *1954, Trudy Inst. okean., 11: 206; Grey, 1955, Fieldiana, Zool., 37: 272.

Cyclothone (Gonostoma) microdon Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 9.

Cyclothone microdon pygmaea Jespersen and Tåning, 1926, Rep. Danish Oceanogr. Exp. 1908-1910, 2, (A 12), p. 7, figs. 5-7, 9, 12; Norman, 1930, Disc. Rep., 2: 288; Sanzo, 1931, Monogr. Fauna Flora Golfo Napoli, 38: 78, 80, figs. 57, 58; Tortonese and Trotti, 1949, Atti Accad. Ligure Sci. Lett., 6, (1), p. 36.

Distribution.—World-wide, including high latitudes in north Atlantic and Antarctic seas, but not in water of negative temperatures. Perhaps replaced in the eastern and north Pacific by *C. acclinidens*. Not reported by Australian or Japanese authors, perhaps because the species inhabits depths beyond the normal range of local fishing vessels.

Of more than 300 hauls containing *C. microdon* made throughout the world, scarcely fifty have been shallower than 1000 meters, about 100 between 1000 and 2000 meters, and about 170 below 2000 meters. The Monaco expeditions carried on the greatest amount of deep-abyssal mid-water fishing, and although we know the number of specimens per haul at only a few of these stations, at several of them (2500-4000 meters) "numerous" examples were caught. Lönnberg (1905, p. 65) also reported numerous specimens from two hauls made in 2700 and 2500 meters. The normal habitat was placed between about 550 and 1450 meters by Holt and Byrne (1913, p. 12) and by Murray and Hjort (1912, p. 619), both conclusions based on hauls made chiefly in depths above 2000 meters.

The following fourteen hauls containing *C. microdon* were made with closing nets.

Eastern Atlantic

Ca. 48° N., 20° W., 2200 meters. Six young specimens in this and the following haul (Collett, 1896).

Ca. 47° N., 22° W., 1300 meters (Collett, 1896).

Mid-Atlantic

Ca. 36° N., 43° W., 4500–1500 meters. Ten specimens (Murray and Hjort, 1912).

Ca. 36° N., 43° W., 1350–450 meters. Twenty-seven specimens (Murray and Hjort, 1912).

Ca. 47° N., 43° W., 950–525 meters. (?)specimens (Murray and Hjort, 1912).

Off South Africa

Ca. 33° S., 15° E., 2500–2000 meters. Twenty-three specimens, 30–60 mm. (Norman, 1930).

Ca. 42° S., 14° E., 1500–900 meters. One specimen (Brauer, 1906).

South Atlantic

Ca. 38° S., 22° W., 2000–1800 meters. Nine specimens, 26–54 mm. (Norman, 1930).

Ca. 53° S., 35° W., 1275–1025 meters. Twenty-two specimens, 34–68 mm. (Norman, 1930).

Ca. 43° S., 46° W., 750–500 meters. One specimen, 27 mm. (Norman, 1930).

Western Pacific

Ca. 1° S., 118° E., 500–345 meters. Two specimens, 18 and 25 mm. (Koumans, 1953).

Ca. 2° S., 121° E., 500–340 meters. One specimen, 20 mm. (Koumans, 1953).

North Indian

Ca. 3° N., 63° E., 1000–555 meters. Three specimens, 20–28 mm. (Koumans, 1953).

Antarctic

Ca. 60° S., 51° W., 1100–1000 meters. Three specimens, 55–60 mm. (Norman, 1930).

It is probably correct to assume that the species inhabits deep-abyssal waters. Figures shown in Tables 4 and 5 suggest that the depth of its maximum abundance is somewhat less (1000–1600 meters) and may vary slightly with latitude. There is also some evidence that a smaller center of distribution may exist in the deep-abyssal zone.

The Mediterranean form, *C. microdon pygmaea* Jespersen and Tåning, inhabits shallower water (maximum occurrence of adult about 1000 meters in summer, 700–800 meters in winter).

Length.—6–76 mm.

Remarks.—Holt and Byrne (1913, p. 15) noted the almost constant presence of small numbers of *C. microdon* in nets fastened to the back of the trawl in hauls taken in about 900–1300 meters and were inclined to believe that the fishes were actually present near the bottom, rather than that their capture in these nets was due to their occurrence in such great numbers at lesser depths that a few inevitably were caught as the nets were being pulled up. The presence of the species near the bottom in these depths may possibly be explained by the fact that it makes daily vertical migrations and thus may drift over lesser depths during the night.¹

Murray and Hjort (1912, p. 621) wrote: “. . . it is perfectly clear that the smaller sizes are met with much higher up than the larger ones, which latter are mainly to be found at a depth of 1500 m.” The same authors also noted that the average size was greater in their more northerly hauls. Data from other sources support the evidence given by these authors and also reveal the fact that in cold seas large specimens are found in shallower water.

Eastern and north Pacific records have been omitted from Tables 4 and 5, both because of the small number of records and because these specimens may prove to be *acclinidens*. The one mid-Pacific record has been omitted also.

Cyclothone acclinidens Garman. Table 6.

Cyclothone acclinidens Garman, 1899, Mem. Mus. Comp. Zool., 24: 247, pl. J, fig. 4—eastern Pacific (type locality not designated).

Cyclothone acclinidens Gierse, 1904, Morph. Jahrb., 32: 602, pls. 14–16; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 85, pl. 6, fig. 1, text fig. 34; Lloyd, 1909, Mem. Indian Mus., 2: 151; Murray and Hjort, 1912, Depths of Ocean, pp. 612, 676, fig. 493; Weber,

¹ Young only? See Marshall, 1951, p. 12.

1913, Monogr. Siboga Exp., 57: 19; Weber and de Beaufort, 1913, Fishes Indo-Austr. Arch., 2: 127; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-1903, 15, Zool., 7: 180; Barnard, 1925, Ann. So. Afr. Mus., 21: 147; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 11; Borodin, 1928, Bull. Vanderbilt Mar. Mus., 1, (1), p. 11; Beebe, 1929, Zoologica, 12: 13; Norman, 1930, Disc. Rep., 2: 288; 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 18; Parr, 1931, Bull. Bingham Oceanogr. Coll., 2, (4), p. 11; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 226; Smith, 1949, Sea Fishes So. Afr., p. 103; Misra, 1950, Rec. Indian Mus., 45: 413; 1953, op. cit., 50: 397, fig. 19, a; Marshall, 1951, Jour. Mar. Res., 10: 3; Follett, 1952, Proc. California Acad. Sci., 27: 409; Koumans, 1953, Temminckia, 9: 183.

Distribution.—Eastern Atlantic, Azores to Cape Point. Mid-Atlantic, 0° 46' N., 18° 59' W. to 17° 28' N., 29° 42' W. Western Atlantic off New York (misidentification?). South Atlantic, ca. 55° S., 18° W. and 56° S., 14° E. Tropical Indian Ocean, northeast coast of Africa, Gulf of Aden, Arabian Sea, Bay of Bengal, to 26° S., 93° E. and 10° S., 97° E. Western Pacific around the Dutch East Indies. Eastern Pacific from 0° 16' to 37° N. and west to 138° W.

C. acclinidens is an abundant species. It has been taken at only about fifteen stations above 1000 meters. Of around ninety hauls made below that depth, half were deeper than 2000 meters, but in most cases the number of specimens taken in each haul was not published, and so it has been impossible to determine the center of distribution. The species probably inhabits deep-abyssal waters, although it may prefer higher levels. It has been reported in three hauls made with closing nets, in the Celebes Sea in 1100-790 meters (two specimens) and in the Arabian Sea in 1045-984 meters (one specimen) and 984-430 meters (seventeen specimens). Extreme depth range 224-4417 meters.

Length.—10-50 mm. (without caudal).

Remarks.—*C. acclinidens* is very close to *C. microdon* and the two species have probably been confused at times. Their vertical distribution appears to be almost identical. If they are actually distinct, or if they represent races of the same species, a difference in horizontal distribution would be expected. However, both species have been reported in the same nets by several authors. Although a study of the literature suggests that *acclinidens* is absent or scarce in the northern and western Atlantic and in the Antarctic, and that it perhaps replaces *microdon* in the eastern and northern Pacific, a further understanding of the two species will require the study of a large series of specimens from all over the world.

Cyclothone obscura Brauer

Cyclothone obscura Brauer, 1902, Zool. Anz., **25**: 280—Indian Ocean, ca. 4° S., 48° E., 2000 meters.

Cyclothone obscura Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, **15**, (1), p. 88, pl. 6, fig. 3, text fig. 35; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901–1903, **15**, Zool., **7**: 181; Barnard, 1925, Ann. So. Afr. Mus., **21**: 147; Norman, 1930, Disc. Rep., **2**: 288; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 227; Smith, 1949, Sea Fishes So. Afr., p. 103; Misra, 1950, Rec. Indian Mus., **45**: 414; 1953, op. cit., **50**: 397, fig. 15, a; Marshall, 1954, Aspects Deep Sea Biol., p. 290.

Distribution.—Eastern Atlantic, ca. 17° N. to 31° S. and 7° E. to 29° W. Indian Ocean, ca. 9°–10° S., 53°–97° E. Forty-four specimens known from twenty-four hauls, of which only three were shallower than 2000 meters (one in 800, two in 1500 meters). Depth range 800–5248 meters.

Length.—12–60 mm. (without caudal).

Family BATHYLACONIDAE

Bathylaco nigricans Goode and Bean

Bathylaco nigricans Goode and Bean, 1895, Ocean. Ichth., p. 57, fig. 69—Atlantic off the Virgin Islands.

Bathylaco nigricans Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., **47**: 540; Parr, 1948, Copeia, p. 52, figs. 1, 2.

Deep-abyssal records and distribution.—Western Atlantic, 4370 meters, the type.

Eastern Pacific off Colombia, 2200 meters, one specimen taken in a pelagic net, with 3500 meters of wire out.

Length.—209–215 mm. (without caudal).

Remarks.—No definite conclusions can be drawn concerning the habitat, but the species probably lives on or near the bottom.

Goode and Bean (1895, p. 58) listed the type from “off Santa Cruz at a depth of 2393 fathoms,” and stated that it was taken by the *Blake*. Jordan and Evermann (1896, p. 540) gave the type locality as “off Santa Cruz, Mexico,” and Jordan, Evermann and Clark (1930, p. 164) as “Gulf of Mexico; off Santa Cruz.” Smith (1888, p. 966) listed only one *Blake* station in a depth of 2393 fathoms, Agassiz Station no. 121, Jan. 2, 1879, 17° 56' 55" N., 64° 54' 15" W., between St. Thomas and Santa Cruz. This locality is near the Virgin Islands; the “Santa Cruz” referred to is undoubtedly the island more commonly known as St. Croix.

Family HARPADONTIDAE¹

The family contains two genera, *Harpadon* Le Sueur, from relatively shallow water in the Indo-Pacific, and *Bathysaurus* Günther, with two species apparently confined to deep-abyssal waters, one of them also inhabiting the abyssal plain below 3660 meters. Both were originally described by Günther from material collected by the *Challenger* and are widely distributed in the Atlantic and Pacific oceans.

Bathysaurus ferox Günther

Bathysaurus ferox Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 182—Pacific off New Zealand, ca. 40° S., 177° E., 2012 meters.

Bathysaurus agassizii Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 215; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 139, pl. 10, fig. 1.

Bathysaurus ferox Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 181, pl. 46, fig. A; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 385; Goode and Bean, 1895, Ocean. Ichth., p. 58, figs. 55, 56; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 539; Murray and Hjort, 1912, Depths of Ocean, pp. 121, 396, fig. 103, a; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 8; Barnard, 1925, Ann. So. Afr. Mus., 21: 228; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 62, pl. 4, fig. 4; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 345, fig. 161; Schroeder, 1940, Copeia, p. 233; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 382, pl. 6, fig. 3; Smith, 1949, Sea Fishes So. Afr., p. 114, fig. 179.

Deep-abyssal records.—Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W., 3120 meters, one specimen.

Eastern Atlantic, ca. 34° N., 33° W., 2615 meters, one specimen.

Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, one specimen.

Eastern Atlantic off Morocco, 2200, 2055 meters, two specimens.

Off South Africa, ca. 33° S., 16° E., 2560 meters, one specimen.

Western Atlantic, ca. 40° N., 68° W., 2250 meters, one specimen.

Western Atlantic, ca. 39° N., 69°–70° W., 2022, 1977 meters, two specimens.

Pacific off New Zealand, 2012 meters, the type.

Distribution.—Eastern Atlantic, 27°–50° N., 8°–33° W., four deep-abyssal specimens and three in 1797 meters. Mid-Atlantic, one deep-abyssal specimen. South Africa off Cape Point and Table Bay, one deep-abyssal specimen and three in 1145–1098 meters. Western Atlantic, 33°–40° N., 68°–76° W., three deep-abyssal specimens

¹ The classification of iniomid fishes used here is that proposed by Dr. Robert R. Harry (MS.).

and three in 1813, 1799, and 1183 meters. Southwestern Pacific, one deep-abyssal specimen. Found principally in deep-abyssal waters.

Length.—216–673 mm.

Bathysaurus mollis Günther

Bathysaurus mollis Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 182—type locality not stated, designated as *Challenger* Station 237, Pacific off Japan, ca. 34° N., 140° E., 3429 meters (locality of adult specimen figured in Günther, 1887, pl. 46, fig. B).

Bathysaurus mollis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 183, pl. 46, fig. B; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 385; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 130; Goode and Bean, 1895, Ocean. Ichth., p. 59; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 10, pl. 1; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 62; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 346, fig. 162; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947–1948, Zool., 2, (1), p. 13.

Bathysaurus obtusirostris Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 136, pl. 10, fig. 2, pl. 14, fig. 3.

Deep-abyssal records and distribution.—Eastern Atlantic, ca. 39° N., 17° W., 4360 meters, one specimen.

Eastern Atlantic, ca. 29° N., 17° W., 4267–4255 meters, one specimen.

Eastern Atlantic off Cape Verde, 3655 meters, one specimen.

Eastern Atlantic, ca. 34° N., 33° W., 2615 meters, one specimen.

Eastern Pacific off Lower California, 3219 meters, one specimen.

South Pacific, ca. 22° S., 150° W., 4361 meters, one specimen.

Western Pacific, 3429 meters, the type.

Restricted to depths below 2000 meters as far as known, and also found on the abyssal plain. Seven specimens reported.

Length.—241–600 mm.

Family CHLOROPHTHALMIDAE

Of the two genera contained in this family, *Bathysauropsis* is monotypic and probably deep-abyssal.

Bathysauropsis gracilis Günther

Chlorophthalmus gracilis Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 182—type locality not stated, designated as *Challenger* Station 300, Pacific off

Juan Fernandez, ca. 33° S., 78° W., 2515 meters (locality of specimen figured in Günther, 1887, pl. 49, fig. A).

Chlorophthalmus gracilis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 194, pl. 49, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 511; Gilchrist, 1906, Mar. Invest. So. Afr., 4: 165; Thompson, *1916, Prov. Cape Good Hope Mar. Biol. Rep., 3: 82; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 7.

Bathysauropsis gracilis Regan, 1911, Ann. Mag. Nat. Hist., (8), 7: 127; Barnard, 1925, Ann. So. Afr. Mus., 21: 230; Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 18; Smith, 1949, Sea Fishes So. Afr., p. 115, pl. 6, fig. 185.

Deep-abyssal records.—South Atlantic, ca. 32° S., 13° W., 2606 meters, one specimen.

Off South Africa, ca. 33° S., 16° E., 2231, 2195 meters, one and an unstated number of specimens (two hauls).

South Pacific off Juan Fernandez, 2515 meters, three specimens.

South Pacific off New Zealand, 2012 meters, one specimen.

Distribution.—South Atlantic, one deep-abyssal specimen. Off Cape Point and Table Bay, South Africa, two deep-abyssal records and at least fifteen specimens in 869 and 1098–1802 meters. South Pacific, two deep-abyssal records.

Length.—102–320 mm.

Family BATHYPTEROIDAE

Bathypteroid fishes are all found in deep water and, except for one or two young specimens taken pelagically, seem always to be caught in bottom-fishing appliances. Furthermore, as stated by Parr (1928, p. 3), the structure of these fishes suggests a benthic existence. Of the eighteen species of *Bathypterois* described, eight are known from deep-abyssal waters but the only one taken in any abundance, *B. dubius*, apparently prefers shallower water. It should be noted that Nybelin (1951, pp. 15, 24, 25) reported from the north Atlantic as *Bathypterois* sp. eleven specimens taken at a depth of 5610–5600 meters (9° 38' N., 26° 20' W.), two at 5000–5025 meters (43° 40' N., 18° 45' W.), and six at 4590–4600 meters (40° 33' N., 35° 24' W.).

Bruun (1952, in litt.; 1955, pl. 4) has written that one specimen of *Benthosaurus* was caught by the *Galathea* Expedition in the Indian Ocean between Madagascar and East Africa, and specimens presumably of the same genus have been seen and photographed in the Mediterranean at depths of 2347 and 2132 meters (MacLeish, 1954; Edgerton, 1955).

Benthosaurus grallator Goode and Bean

Benthosaurus grallator Goode and Bean, 1886, Bull. Mus. Comp. Zool., 12: 168—Gulf of Mexico, 3384 meters.

Benthosaurus grallator Goode and Bean, 1895, Ocean. Ichth., p. 62, fig. 73; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 543; 1900, op. cit., fig. 237; Murray and Hjort, 1912, Depths of Ocean, pp. 396, 686, fig. 501, c, 502; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 64; Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 23; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 360, fig. 172.

Skagerakia nilssoni Nybelin, 1946, Ark. Zool., 38B, (2), p. 4, figs. 3, 4; 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 32, pl. 2, fig. 3, pl. 3, fig. 3.

Deep-abyssal records and distribution.—Western Atlantic, Gulf of Mexico, 3384 meters, one specimen.

Western Atlantic, ca. 39° N., 70° W., 2810 meters, one specimen.

Western Atlantic, Gulf of Mexico, 2104–2194 meters, three specimens (Oregon Station 1303, 28° 47' N., 87° 50' W., May 26, 1955).

Eastern Atlantic, ca. 34° N., 33° W., 2865 meters, two specimens.

Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 meters, one specimen.

Length.—154–346 mm. (without caudal).

Remarks.—Three recently caught specimens from the Gulf of Mexico show eastern and western Atlantic specimens to be the same. Mr. Robert Kanazawa, of the U. S. National Museum, has also examined one of the types (not the figured specimen), has compared it with the photograph of *Skagerakia nilssoni* Nybelin and has written (in litt., 1955) that the general appearance and profile are similar, the lateral line turns up toward the upper caudal lobe, which is larger than the lower (exclusive of the prolonged ray), and the dorsal count is 12, anal 13. A careful comparison of all published accounts has revealed no constant differences between western and eastern Atlantic examples.

Bathypterois dubius Vaillant

Bathypterois dubius Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 124, pl. 9, fig. 1, pl. 12, fig. 4, pl. 14, fig. 4, pl. 15, fig. 4—Atlantic off North Africa, Canaries, Azores, type locality not stated¹ (see footnote, p. 110).

¹ Bertin and Estève (1951, p. 9) reported that the type specimen, in the Paris Museum, was taken at *Talisman* Station 128. Vaillant (1888, p. 133), who did not specify the type locality, did not include Station 128 in his listing under *B. dubius*, nor in his list on pages 32–58.

Bathypterois longifilis Carus, 1893, Prodr. Faunae Medit., 2: 562.

Bathypterois dubius Goode and Bean, 1895, Ocean. Ichth., p. 64, fig. 74; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 105, pl. 4, fig. 19; Koehler, 1896, Ann. Univ. Lyon, 26: 507; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 16; Murray and Hjort, 1912, Depths of Ocean, pp. 80, 396, 686, figs. 57, b, 266, 501, b; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 34; Vaillant, in Roule, 1919, op. cit., p. 130; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 63; Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 26; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 31; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 356, fig. 169; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 397, fig. 119; Pardi, 1951, Monit. Zool. Ital., 58: 125, fig.; Bertin and Estève, 1951, Cat. Types Poiss., 6: 9; Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 192; Marshall, 1954, Aspects Deep Sea Biol., pp. 249-250, fig. ix-15.

Deep-abyssal record.—Eastern Atlantic, ca. 39° N., 26° W., 1940 meters, one specimen.

Distribution.—Eastern Atlantic from off southwestern Ireland to ca. 16° N. and west to 33° W., more than one hundred specimens known in 800-1805 meters and one taken from deep-abyssal waters. Mediterranean, two specimens, one taken at Messina, the second in the Tyrrhenian Sea below 300 meters; a third example, from the Ionian Sea, reported as *B. longifilis* Günther, probably belongs to *B. dubius* (Pardi, 1951, p. 125). Probably only accidental in the deep-abyssal zone.

Length.—116 (standard)—260 mm.

Bathypterois pectoralis Garman

Bathypterois pectoralis Garman, 1899, Mem. Mus. Comp. Zool., 24: 257, pl. K, fig. 1—off the Galapagos Islands to ca. 23° N., 108° W. (type locality not stated).

Bathypterois pectoralis Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 26, footnote.

Deep-abyssal records.—Eastern Pacific, ca. 3° N., 82° W., 2070 meters, an unstated number of specimens from one haul.

Eastern Pacific, ca. 7° N., 79° W., 1865 meters, an unstated number of specimens from one haul.

Distribution.—Eastern Pacific only, from off the Galapagos Islands (0° 4' S., 90° W.) to Mexico (ca. 23° N., 108° W.), an unstated number of specimens from four hauls, two of them deep-abyssal, one in 1820 meters and one in 1619 meters.

Length.—?—254 mm.

Bathypterois antennatus Gilbert

Bathypterois antennatus Gilbert, 1905, Bull. U. S. Fish Comm., 23: 590, fig. 235
—Pacific off Bird Island, Hawaiian Islands, 571–1463 meters.

Bathypterois atricolor antennatus Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 31; Matsubara, 1954, Jap. Jour. Ichth., 3: 62, fig. 1.

Bathypterois longifilis Fowler, 1928, Mem. Bishop Mus., 10: 66 (part).

Bathypterois antennatus Böhlke, 1953, Stanf. Ichth. Bull., 5: 17.

Deep-abyssal record.—Hawaiian Islands near Kauai, 1829–2403 meters, one specimen.

Distribution.—Mid-Pacific off the Hawaiian Islands, one deep-abyssal specimen and one in 571–1463 meters. Western Pacific off Japan (Mie Prefecture), one specimen in ca. 258 meters.

Length.—165–200 mm.

Remarks.—*B. atricolor indicus* Brauer (1906, p. 144), known from one specimen taken at a depth of 1644 meters off the northeast coast of Africa, is synonymized with this species by Parr (1928, p. 31).

Bathypterois phenax Parr

Bathypterois atricolor phenax Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 31—near the Bahama Islands, 1645–1729 meters.

Bathypterois atricolor phenax Shanklin, 1934, Acta Zool. Stockholm, 15: 409, figs. 6–8; 1935, Phil. Trans. London, (B), 224: 361, figs. 12–19.

Deep-abyssal record.—Gulf of Mexico, 2104–2194 meters, two specimens (Oregon Station 1303, 28° 47' N., 87° 50' W., May 26, 1955).

Distribution.—Western Atlantic only, two deep-abyssal specimens from the Gulf of Mexico and two specimens in 1645–1729 meters from near the Bahamas.

Length.—86–162 mm. (without caudal).

Bathypterois longipes Günther

Bathypterois longipes Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 184—Atlantic off Montevideo, ca. 36° S., 46° W., 4846 meters.

?*Bathypterois longicauda* Günther, 1878, loc. cit.; 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 188, pl. 26, fig. B.

Bathypterois longipes Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 188, pl. 48, fig. A; Goode and Bean, 1895, Ocean Ichth., p. 66, fig. 76; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 546; Boulenger, 1904, Cambr. Nat. Hist., 7: 613; Murray and Hjort, 1912, Depths of Ocean, pp. 396, 414, 416, 418; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 63; Parr, 1928, Bull. Bingham

Oceanogr. Coll., 3, (3), p. 26; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 357, fig. 170.

Deep-abyssal records.—South Atlantic off Montevideo, 4846 meters, two specimens.

Western Atlantic, ca. 36° N., 69° W., 4593 meters, one specimen.

Eastern Atlantic, ca. 34° N., 33° W., 2620 meters, two specimens.

?South Pacific, ca. 39° S., 131° W., 4663 meters, one specimen.

Distribution.—Eastern Atlantic, one deep-abyssal record. Western Atlantic in the Gulf of Mexico and off the United States coast (36°–39° N.), one deep-abyssal specimen and three in 1747, 986 and 827 meters. South Atlantic off Montevideo, one deep-abyssal record. ?South Pacific, one deep-abyssal record.

Length.—63.5–229 mm.

Remarks.—*B. longicauda* was based on a young and damaged specimen; its identity with *longipes* is not certain.

Bathypterois filiferus Gilchrist

Bathypterois filiferus Gilchrist, 1906, Mar. Invest. So. Afr., 4: 166, pl. 48—Atlantic off South Africa, 1645 meters.

Bathypterois filiferus Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 7; Barnard, 1925, Ann. So. Afr. Mus., 21: 233; Smith, 1949, Sea Fishes So. Afr., p. 114.

Bathypterois capensis Smith, 1949, op. cit., pl. 6, fig. 183.

Deep-abyssal records.—Off Cape Point, South Africa, ca. 33° S., 16° E., 2561, 2231 meters, five specimens in two hauls.

Distribution.—South Africa off Cape Point, five deep-abyssal specimens and twenty-two in 1098–1829 meters.

Length.—223 (standard) –300 mm.

Remarks.—See remarks under *B. capensis*.

Bathypterois insularum Alcock

Bathypterois insularum Alcock, 1892, Ann. Mag. Nat. Hist., (6), 10: 356—Arabian Sea, ca. 14° N., 72° E.

Bathypterois insularum Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 158; Alcock and McArdle, 1900, Ill. Zool. Investigator, Fishes, pl. 32, fig. 1; Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 27; Misra, 1950, Rec. Indian Mus., 45: 427; 1953, op. cit., 50: 416, fig. 26, a.

Deep-abyssal record and distribution.—Arabian Sea, 2084 meters, two specimens.

Length.—140 mm.

Bathypterois capensis Gilchrist and von Bonde

Bathypterois capensis Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 8, pl. 2, fig. 1—Atlantic off South Africa, ca. 33° S., 16° E.

Bathypterois Gilchrist, 1922, Rep. Fish. Mar. Biol. Surv. So. Afr., 2: 44.

Bathypterois capensis Barnard, 1925, Ann. So. Afr. Mus., 21: 233; Smith, 1949, Sea Fishes So. Afr., p. 114 (part, not pl. 6, fig. 183).

Deep-abyssal record and distribution.—Off Table Bay, South Africa, 2231 meters, three specimens.

Length.—(?)—200 mm.

Remarks.—Parr (1928, p. 27) believed this species to be a synonym of *B. insularum* but it seems to differ from that species in having a deeper body and shorter tail. The range according to Smith (1949, p. 114) is "from the Cape to Algoa Bay in 800–1200 fathoms" but there is no information about the source of the added locality and depth (Algoa Bay, 800 fathoms). This locality may apply to the figured specimen (op. cit., pl. 6, fig. 183), which appears to belong to *B. filiferus* rather than to *B. capensis* as it is labeled, judging by the position of the anal fin, the scalation, and the length and form of the caudal peduncle.

Family IPNOPIDAE

A highly specialized and almost exclusively deep-abyssal family, which includes only five species.

Bathymicrops regis Hjort and Koefoed

Bathymicrops regis Hjort and Koefoed, in Murray and Hjort, 1912, Depths of Ocean, pp. 88, 396, 416, 686, 687, figs. 305, 501, *d*—Atlantic, ca. 28° N., 24° W., 5000 meters.

Bathymicrops regis Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 64, pl. 5, figs. 1–3; Parr, 1928, Bull. Bingham Oceanographic Coll., 3, (3), p. 23; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 347, fig. 163; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947–1948, Zool., 2, (1), pp. 13, 16, 19; Marshall, 1954, Aspects Deep Sea Biol., p. 232, fig. ix-7.

Deep-abyssal records and distribution.—Eastern Atlantic, ca. 1° N., 18° W., 5250–5300 meters, four specimens.

Eastern Atlantic, 5000 meters, the type.

Eastern Atlantic, ca. 29° N., 17° W., 4267–4255 meters, two specimens.

Western Atlantic, ca. 12° N., 52° W., 5044–5033 meters, one specimen.

Apparently restricted to the abyssal plain.

Length.—?—110 mm.

Bathymicrops sewelli Norman

Bathymicrops sewelli Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 26, fig. 7—Arabian Sea, ca. 9° N., 55° E.

Deep-abyssal record and distribution.—Arabian Sea, 3840-3872 meters, one specimen.

Length.—350 mm.

Remarks.—Harry (MS.) has remarked that the differences between this species and *B. regis* are such that *B. sewelli* should probably be placed in a separate genus.

Ipnops murrayi Günther

Ipnops murrayi Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 187—type locality not stated, here designated as *Challenger* Station 133, Atlantic near Tristan da Cunha, ca. 35° S., 20° W., 3475 meters, the locality of the specimen figured in Günther, 1887.

Ipnops murrayi Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 191, pl. 49, fig. B; Moseley, 1887, op. cit., p. 269, pls. 67, 68; Goode and Bean, 1895, Ocean. Ichth., p. 67, figs. 67-68; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 547; 1900, op. cit., fig. 239; Boulenger, 1904, Cambr. Nat. Hist., 7: 613; Gilchrist, 1906, Mar. Invest. So. Afr., 4: 166; Murray and Hjort, 1912, Depths of Ocean, p. 686, fig. 501, e; Weber and de Beaufort, 1913, Fishes Indo-Austr. Arch., 2: 179, fig. 70; Barnard, 1925, Ann. So. Afr. Mus., 21: 231; Parr, 1928, Bull. Bingham Oceanogr. Coll., 3, (3), p. 23; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 27; Smith, 1949, Sea Fishes So. Afr., p. 117, fig. 189.

Deep-abyssal records.—Western Pacific, Celebes Sea, ca. 2° N., 124° E., 3932 meters, one specimen.

South Atlantic near Tristan da Cunha, 3475 meters, two specimens.

South Atlantic off Brazil, ca. 10° S., 35° W., 2926 meters, one specimen.

Western Atlantic off Bequia Island, 2756 meters, one specimen.

Western Atlantic, Gulf of Mexico, 2104-2194 meters, one specimen (*Oregon* Station 1303, 28° 47' N., 87° 50' W., May 26, 1955).

Distribution.—Off Cape Point, South Africa, one specimen in 1463-1645 meters. Western Atlantic, two deep-abyssal specimens and one in the Gulf of Mexico in 1747 meters. South Atlantic, two deep-abyssal records. Western Pacific, one deep-abyssal record.

Indian Ocean near Zanzibar, three specimens in 1789 meters. Probably a deep-abyssal form, extending also to the abyssal plain.

Length.—83–140 mm.

Ipnops agassizi Garman

Ipnops Agassizii Garman, 1899, Mem. Mus. Comp. Zool., 24: 259, pl. H, fig. 2—Pacific off the Galapagos Islands, ca. 2° N., 96° W.

Ipnops Agassizii Lendenfeld, 1905, op. cit., 30: 202, pl. 1, figs. 3–5.

?*Ipnops Agassizii*, 1906, op. cit., 33: 6.

Deep-abyssal record and distribution.—Eastern Pacific, 2488 meters, (?) specimens.

Length.—165 mm.

Remarks.—Agassiz (1906, p. 6) mentioned that this species was again caught in bottom hauls north of Callao, Peru, where dredging was carried on by the *Albatross* almost entirely below 3660 meters, the only exception being 838 meters, Station 4673.

Ipnops pristibrachium Fowler

Ipnops pristibrachium Fowler, 1943, Bull. U. S. Nat. Mus., 100, (14), p. 56, fig.—Pacific, Gulf of Tomini, 1393 meters.

Deep-abyssal record.—Western Pacific, Gulf of Tomini, 1992 meters, one specimen.

Distribution.—Western Pacific, Gulf of Tomini, one deep-abyssal specimen and two in 1525 and 1393 meters.

Length.—128–158 mm.

Family EURYPHARYNGIDAE

Eurypharynx pelecanoioides Vaillant. Table 7.

Eurypharynx pelecanoioides Vaillant, *1882, C. R. Acad. Sci. Paris, 95: 1226—Atlantic off Morocco (see footnote, p. 110).

Eurypharynx pelecanoioides Vaillant, *1883, Nature, Paris, p. 131, fig.; 1883, Ann. Mag. Nat. Hist., (5), 11: 67; 1888, Exp. Sci. Trav. Talis., Poiss., p. 198, pl. 17, fig. 1; Gill and Ryder, 1883, Proc. U. S. Nat. Mus., 6: 271; 1884, op. cit., 7: 48; Goode and Bean, 1895, Ocean. Ichth., p. 159, fig. 177; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 406; Roule, 1914, C. R. Acad. Sci. Paris, 158: 1822; 1916, Bull. Inst. Océanogr. Monaco, 320: 2; 1919, Rés. Camp. Sci. Monaco, 52: 94; 1934, Poiss. Monde Viv. Eaux, 7: 235, text fig. and p. 250, pl.; Norman, 1930, Disc. Rep., 2: 337; Borodin, 1931, Bull. Mus. Comp. Zool., 72: 75; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 73; Zugmayer, in Roule and Angel, 1933, op. cit., p. 85; Bertin, 1934, Bull. Mus. Hist. Nat. Paris, (2), 6: 30; 1934,

- Dana Rep., 3: 1, pl. 1, fig. 2, text figs. 1-26; 1938, op. cit., 15: 13; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 6; 1937, op. cit., 3, (7), p. 60; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 327, fig. 154; Beebe, 1937, Zoologica, 22: 202; Schroeder, 1940, Copeia, p. 233; Tchernavin, 1946, Nature, London, 158: 667, fig.; 1947, Jour. Linn. Soc. London, 41: 298, pl. 2, fig. 1, pl. 3, figs. 1, 2, text figs. 2, 3, 6-11, 15, A, B; 1947, op. cit., p. 378, pl. 8, text figs. 1-8; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 577, fig. 169; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 48; Marshall, 1954, Aspects Deep Sea Biol., pp. 141, 227, 240, pl. 4 and fig. ix-11; Koefoed, 1955, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), (4), p. 9, pl. 2, fig. D; Grey, 1955, Fieldiana, Zool., 37: 289.
- Saccopharynx flagellum* Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 223.
- Gastrostomus bairdii* Gill and Ryder, 1883, Proc. U. S. Nat. Mus., 6: 271; 1884, op. cit., 7: 65; Gill, 1884, Nature, London, 29: 236; Goode and Bean, 1895, Ocean. Ichth., p. 159, figs. 180, 182; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 406; 1900, op. cit., fig. 176; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 88, pl. 4, fig. 3; 1913, Bull. Inst. Océanogr. Monaco, 254: 1, fig.; Murray and Hjort, 1912, Depths of Ocean, pp. 97, 101, 104, 118, 605, 612, 618, 625, 627, 664, 665, 667, 681, 699, 739-741, 749, 750, figs. 83, a, 459, 490, 529, 530, 545; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-1903, 15, Zool., 7: 185; Nusbaum-Hilarowicz, 1915, Bull. Inst. Océanogr. Monaco, 307: 1; 1915, op. cit., 313: 1; 1916, op. cit., 315: 1; 1923, Rés. Camp. Sci. Monaco, 65: 3, 10, 25, 52, pls. 1, 3, figs. 15-21, pls. 4, 5, figs. 1, 2, pl. 7, fig. 14, pls. 8-10, figs. 1-4; Hollister, 1930, Bull. N. Y. Zool. Soc., 33: 72, fig.; Beebe, 1930, op. cit., p. 57, fig.; 1934, Nat. Geogr. Mag., 66: 699, pl. 15; 1936, Bull. N. Y. Zool. Soc., 39: 105, pl.
- Saccopharynx pelecanoioides* Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 262.
- Saccopharynx bairdii* Günther, 1887, op. cit., p. 262.
- Megalopharynx longicaudatus* Brauer, *1900, Schild. deutschen Tiefsee Exp., p. 521.
- Macropharynx longicaudatus* Brauer, 1902, Zool. Anz., 25: 290; 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 134, pl. 8.
- Gastrostomus pacificus* Bean, 1904, Smiths. Misc. Coll., 45: 254, fig. 31.
- ?*Eurypharynx* sp. Agassiz, 1906, Mem. Mus. Comp. Zool., 33: 12.
- Leptocephalus Gastrostomi Bairdii* Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 35, pl. 6, fig. 5.
- Eurypharynx (Gastrostomus) pacificus* Roule, 1914, C. R. Acad. Sci. Paris, 158: 1822.
- ?*Eurypharynx richardi* Roule, 1914, op. cit., p. 1823; 1916, Bull. Inst. Océanogr. Monaco, 320: 3; 1919, Rés. Camp. Sci. Monaco, 52: 94, pl. 6, fig. 1; Fowler, 1925, Amer. Mus. Nov., 162: 2; 1925, Copeia, p. 75; 1936, Bull. Amer. Mus. Nat. Hist., 70: 327, fig. 154; Bertin, 1934, Dana Rep., 3: 30; 1934, Bull. Mus. Hist. Nat. Paris, 6: 30; Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 60; Tchernavin, 1947, Jour. Linn. Soc. London, 41: 299; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 4.

Eurypharynx Bertin, 1932, Bull. Soc. Zool. France, 57: 145, figs. 2, 4; Berg, 1948, C. R. Acad. Sci. Moscow, 59: 1353; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947-1948, Zool., 2, (1), p. 20.

Gastrostomus Bertin, 1932, Bull. Soc. Zool. France, 57: 148, figs. 5, 6; Gregory, 1933, Trans. Amer. Phil. Soc., 23: 213, fig. 94.

?*Eurypharynx* sp. Tchernavin, 1947, Jour. Linn. Soc. London, 41: 299, fig. 1.

Distribution.—Atlantic Ocean from ca. 50° N., 27° W. to ca. 7° S., 8° W. in the east, to ca. 17° N. in the west and, centrally, to ca. 11° S., 18° W. (Table 7). Eastern Pacific between the Galapagos Islands and Peru, one specimen, 549 meters. Mid-Pacific between Midway and Guam, one specimen.¹ Southwestern Pacific near New Zealand, ca. 41° S., 176° E. and ca. 33° S., 165° E., two specimens, 2000 and 2500 meters. Western Pacific around the Dutch East Indies, ca. 5° S.–6° N., 123°–138° E., nine specimens, 2000–3500 meters. North Indian Ocean, ca. 12° S., 96° E., one specimen, 1700 meters.

E. pelecanoioides is known only from tropical and temperate seas, in deep water, and has been taken most frequently in the Atlantic. Its center of distribution seems to be in about 1400–2800 meters, with perhaps a deeper area of concentration, in the eastern Atlantic, at 3400–4200 meters. There is one closing net record, in 1500 meters (Borodin, 1931). At least 250 specimens have been recorded and the species may therefore be considered a relatively common one. Extreme range 549–7625 meters.

Length.—77–600 mm.

Family SIMENCHELYIDAE

The family contains only one species.

Simenchelys parasiticus Gill

Simenchelys parasiticus Gill, in Goode and Bean, 1879, Bull. Essex Inst., 11: 27—Atlantic off New England.

Simenchelys parasiticus Goode, 1881, Proc. U. S. Nat. Mus., 3: 485; Jordan and Gilbert, 1882, Bull. U. S. Nat. Mus., 16: 363; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 252; Gill, 1890, Proc. U. S. Nat. Mus., 13: 239; Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 670; Goode and Bean, 1895, Ocean. Ichth., p. 139, fig. 161; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 349; 1900, op. cit., fig. 144;

¹ Bertin (1934, p. 28) listed the mid-Pacific specimen as having come from the surface, but it was probably caught in much deeper water. The fish was found entangled in the sounding wire over a bottom depth somewhere between 3660 and 5486 meters.

Collett, 1896, Rés. Camp. Sci. Monaco, **10**: 156, pl. 5, fig. 22, pl. 6, fig. 2; Albert I of Monaco, 1898, Geogr. Jour., **12**: 461, fig.; Zugmayer, 1911, Rés. Camp. Sci. Monaco, **35**: 83; Cockerell, 1913, Proc. Biol. Soc. Washington, **26**: 75; Schmidt, *1913, Medd. Komm. Havunders., Ser. Fisk., **3**, (1), p. 14, pl. 2; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, **52**: 135; Jaquet, 1920, op. cit., **56**: 2, pls. 1-5; Bigelow and Welsh, 1925, Bull. U. S. Bur. Fish., **40**, (1), p. 83, fig. 34; Barnard, 1925, Ann. So. Afr. Mus., **21**: 181, pl. 8, fig. 6; Tanaka, 1928, Fig. Descr. Fishes Japan, **42**: 810, pl. 173, fig. 476; Roule, 1934, Poiss. Monde Viv. Eaux, **7**: 219-220, fig.; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 263, fig. 122; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., **11**: 514, fig. 164; Smith, 1949, Sea Fishes So. Afr., p. 387, fig. 1093; Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., **53**, (74), p. 157, fig. 71; Scholander and Van Dam, 1953, Biol. Bull., **104**: 76.

Conchognathus grimaldii Collett, *1889, Bull. Soc. Zool. France, **14**: 123.

Gymnosimenchelys leptosomus Tanaka, 1908, Jour. Coll. Sci. Imp. Univ. Tokyo, **23**, (13), p. 2, pl. 2, fig. 2.

Simenchelys doffeini Franz, 1910, Abh. Bayer. Akad. Wiss., **4**, Suppl., p. 10, pl. 3, figs. 1, 2.

Simenchelys leptosomus Jordan and Thompson, 1914, Mem. Carnegie Mus., **6**: 233.

Deep-abyssal records.—Eastern Atlantic, ca. 46° N., 5° W., 2620 meters, fourteen specimens.

Eastern Atlantic, ca. 32° N., 17° W., 2480 meters, two specimens.

Eastern Atlantic, ca. 38° N., 30° W., 2000 meters, two specimens.

Distribution.—Eastern Atlantic from ca. 15° to 46° N., 2°-33° W., three deep-abyssal records and many specimens in 880-1779 meters. Western Atlantic, 38°-44° N., 56°-73° W., common, 366-1645 meters. Off Cape Point, South Africa, (?) specimens, 1482 meters. Western Pacific, Japan, off Province Izu to Hokkaido, "rare" in ca. 731 meters. Probably not common in deep-abyssal waters. Center of distribution apparently between 700 and 1400 meters. Locally abundant.

Length.—95-610 mm.

Family NETTASTOMIDAE

A family of deep-sea eels with about seven genera and fifteen species, nettastomids are found in temperate and tropical seas throughout the world. Members of the genus *Venefica* seem to be inclined toward very deep water but there are only four deep-abyssal records. The species are little known and, although they are perhaps benthic, cannot with certainty be included in the deep-abyssal fauna.

Venefica proboscidea Vaillant

Nettastoma proboscideum Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 84, pl. 7, fig. 3—Atlantic off Morocco, 2200 meters, *Talisman* Station 39 (see footnote, p. 110).

Venefica proboscidea Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 652; Goode and Bean, 1895, Ocean. Ichth., p. 150; Lloyd, 1909, Mem. Indian Mus., 2: 151; Barnard, 1925, Ann. So. Afr. Mus., 21: 194; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 281; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 37, fig. 10; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 541, pl. 8, fig. 3; Smith, 1949, Sea Fishes So. Afr., p. 395.

Deep-abyssal records.—Eastern Atlantic off Morocco, 2200 meters, one specimen.

Indian Ocean, Arabian Sea, ca. 22° N., 64° E., 1893 meters, one specimen.

Distribution.—Eastern Atlantic, one deep-abyssal specimen. South Africa off Cape Point, one specimen, 1207 meters. Indian Ocean, one deep-abyssal record and, in the Gulf of Manaar, one specimen, 1624 meters.

Length.—510-960 mm.

Venefica procera Goode and Bean

Nettastoma procerum Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 224—ca. 33° N., 76° W., 1183 meters.

Nettastoma procerum Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 253.

Venefica procera Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 652; Goode and Bean, 1895, Ocean. Ichth., p. 149, fig. 168; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 365; Weber, 1913, Monogr. Siboga Exp., 57: 45, pl. 5, fig. 4; Weber and de Beaufort, 1916, Fishes Indo-Austr. Arch., 3: 271, figs. 118, 119.

Deep-abyssal record.—Western Atlantic, Gulf of Mexico, 2104-2194 meters, three specimens in one haul (*Oregon* Station 1303, 28° 47' N., 87° 50' W., May 26, 1955).

Distribution.—Western Atlantic, one deep-abyssal record and four specimens in 326-1183 meters from three hauls in the Caribbean Sea (ca. 16° N., 62° W.) and off the United States coast (33°-34° N., 76° W.). Western Pacific, Celebes Sea, one specimen in 1301 meters.

Length.—? and 520-ca. 800 mm.

Remarks.—The statement by Jordan and Evermann (1896, p. 366) that the *Albatross* captured a specimen off San Pedro,

California, is probably an error. The specimen referred to is perhaps *V. tentaculata* Garman, recorded by Gilbert in 1915 (p. 309).

Weber's statement (1913, p. 45) that the types were taken in 1993 meters is also an error, and I find no record from 2200 meters, the lower limit of the range of the species according to Weber.

Venefica ocella Garman

Venefica ocella Garman, 1899, Mem. Mus. Comp. Zool., 24: 318, pl. 61, fig. 2—Pacific off Panama, ca. 5° N., 86° W.

Deep-abyssal record and distribution.—Eastern Pacific, 1951 meters, one specimen.

Length.—940 mm.

Family CONGRIDAE

Only one specimen of this large and well-known family of eels has been taken from deep-abyssal waters, although numerous deep-sea species are found at lesser depths.

Promyllantor purpureus Alcock

Promyllantor purpureus Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 310—Arabian Sea, ca. 11° N., 74° E.

Promyllantor purpureus Alcock, 1892, Ill. Zool. Investigator, Fishes, pl. 6, fig. 2; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 202; Goode and Bean, 1895, Ocean. Ichth., pp. 139, 517.

Deep-abyssal record and distribution.—Arabian Sea, 1829 meters, one specimen.

Length.—432 mm.

Family ILYOPHIDAE

Ilyophis brunneus Gilbert

Ilyophis brunneus Gilbert, in Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 671—Pacific near the Galapagos Islands, ca. 0° 36' S., 89° W., 1159 meters.

Ilyophis brunneus Gilbert, 1891, Proc. U. S. Nat. Mus., 14: 352; Goode and Bean, 1895, Ocean. Ichth., p. 141, fig. 162; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 350; ?Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 18; Barnard, 1925, Ann. So. Afr. Mus., 21: 182; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 61; Parr, 1932, Bull. Bingham Oceanogr. Coll., 3, (5), p. 35, fig. 15; Smith, 1949, Sea Fishes So. Afr., p. 387, fig. 1092.

?*Leptocephalus Histiobranchi infernalis* (or *L. Ilyophididis brunnei*) Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 14, pl. 2, fig. 5.

Deep-abyssal record.—Eastern Atlantic, ca. 34° N., 33° W., 2615 meters, one specimen.

Distribution.—Eastern Atlantic, one specimen from deep-abyssal waters. Western Atlantic near the Bahama Islands, one specimen in 1298–1318 meters. Off Cape Point, South Africa, two specimens in 1463 meters. Eastern Pacific, one specimen in 1159 meters.

Length.—120–575 mm.

Family SYNAPHOBRANCHIDAE

Although pelagic when young, synaphobranch eels probably live on or near the ocean floor as adults, most of them in depths below 1000 meters. Only adult specimens are considered here. Five species have been found in deep-abyssal waters, one of them also known from the abyssal plain. *S. infernalis*, *S. bathybius*, and *S. australis* are closely related and may prove eventually to be forms of an almost exclusively deep-abyssal species.

The family is widely distributed in the Atlantic Ocean and is found also in the Indo-Pacific, near Hawaii, and in the north Pacific.

Synaphobranchus infernalis Gill

Histiobranchus infernalis Gill, 1883, Proc. U. S. Nat. Mus., 6: 255—Atlantic off U. S. coast, ca. 38° N., 69° W., 3166 meters.

Synaphobranchus infernalis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 254; Regan, 1913, Trans. Roy. Soc. Edinburgh, 40: 235; Bruun, 1936, Bull. Inst. Océanogr. Monaco, 700: 5; 1937, Dana Rep., 9: 5, figs. 1, 3, 10–12, 14, 17; Norman and Trewavas, 1939, Ann. Mag. Nat. Hist., (11), 3: 358.

Histiobranchus infernalis Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 673; Goode and Bean, 1895, Ocean. Ichth., p. 145, fig. 165; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 352; 1900, op. cit., fig. 147; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 85; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1209; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 59.

Histiobranchus bathybius or *H. infernalis* Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 7.

?*Leptocephalus Histiobranchi infernalis* (or *L. Ilyophididis brunnei*) Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 14, pl. 2, fig. 5.

Histiobranchus bathybius Koefoed, 1927, op. cit., 4, (1), p. 60.

Leptocephalus Synphobranchus infernalis Bruun, 1937, Dana Rep., 9: 11, pl. 1, fig. 5.

Deep-abyssal records.—Western Atlantic, 3166 meters, the type. Davis Strait, ca. 60° N., 54° W., 3136 meters, one specimen.

Davis Strait, ca. 61° N., 56° W., 2624 meters, one specimen.

Western Atlantic, ca. 36° N., 74° W., 2266 meters, one specimen.

Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W., 3120 meters, two specimens.

Eastern Atlantic, ca. 34° N., 33° W., 2615 meters, four specimens.

Distribution.—Eastern Atlantic, one deep-abyssal record, one specimen in 1560 meters (ca. 37° N., 25° W.) and one young example caught in mid-water in 1500–2000 meters, a doubtful identification (ca. 48° N., 13° W.). Mid-Atlantic, one deep-abyssal record. Western Atlantic, Davis Strait and 31°–38° N., four deep-abyssal records and one specimen in 644 meters. Thirteen specimens in all, ten of them deep-abyssal.

Length.—78–900 mm. Leptocephali 30–90 mm.

Synphobranchus bathybius Günther

Synphobranchus bathybius Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 445 (part)—Pacific, ca. 36° N., 178° E., 3749 meters.

Synphobranchus bathybius Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 254, pl. 62, fig. B; Bruun, 1937, Dana Rep., 9: 7, fig. 2; Norman and Trewavas, 1939, Ann. Mag. Nat. Hist., (11), 3: 358.

Histiobranchus bathybius Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 673; Gilbert, 1896, op. cit., 1893: 402; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 352; Regan, 1913, Trans. Roy. Soc. Edinburgh, 40: 235; Smith, 1949, Sea Fishes So. Afr., p. 386, fig. 1090 (part).

Synphobranchus (Histiobranchus) bathybius Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 45.

Deep-abyssal records.—Mid-Pacific, 3749 meters, the type.

Western Pacific, ca. 34° N., 140° E., 3429 meters, nine specimens.

North Pacific, ca. 56° N., 172° W., 2971 meters, one specimen.

North Indian Ocean near Zanzibar, 2926 meters, one specimen.

Distribution.—Pacific in Bering Sea, off Japan and northwest of the Hawaiian Islands. North Indian Ocean. Exclusively deep-abyssal and reaching the abyssal plain.

Length.—258–622 mm.

Synphobranchus australis Regan

Synphobranchus australis Regan, 1913, Trans. Roy. Soc. Edinburgh, 40: 235, pl. 8, fig. 5—Indian Ocean, ca. 46° S., 45° E., 2515 meters.

Synphobranchus bathybius Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 445 (part); 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 254 (part).

Synphobranchus australis Regan and Trewavas, 1939, Ann. Mag. Nat. Hist., (11), 3: 359.

Histiobranchus bathybius Smith, 1949, Sea Fishes So. Afr., p. 386 (part).

Deep-abyssal records and distribution.—South Atlantic, ca. 48° S., 10° W., 3185 meters, one specimen.

South Indian Ocean, 2515 meters, the type.

Length.—350–470 mm.

Synphobranchus kaupi Johnson. Table 8.

Synphobranchus kaupii Johnson, 1862, Proc. Zool. Soc. London, p. 169—Atlantic off Madeira.

Synphobranchus pinnatus Günther, 1870, Cat. Fishes Brit. Mus., 8: 23; 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 254, pl. 62, fig. A; Goode and Bean, 1879, Bull. Essex Inst., 11: 26; 1883, Bull. Mus. Comp. Zool., 10: 223; 1895, Ocean. Ichth., p. 143, fig. 164; Goode, 1881, Proc. U. S. Nat. Mus., 3: 485; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 88, pl. 6, fig. 2; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 135; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 351; 1900, op. cit., fig. 146; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 54; 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 45; Ehrenbaum, 1902, Fauna Arct., 2: 139; 1909, Nord. Plankton, Zool., 1: 387, fig. 147; Bragança, *1903, Cat. Coll. Exp. Palacio Cristal Portuense, p. 40; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 7, fig.; Schmidt, *1906, Rapp. Proc. Verb. Cons. Perm. Intern. Explor. Mer, 5: 236, pl. 9, figs. 4–6; *1909, Medd. Komm. Havunders. Ser. Fisk., 3: 7; Byrne, 1907, Jour. Mar. Biol. Assoc., 8: 1; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 84; Zugmayer, in Roule and Angel, 1933, op. cit., 86: 85; Murray and Hjort, 1912, Depths of Ocean, pp. 80, 101, 395, 423, figs. 57, a, 264; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 99, pl. 6, fig. 3, b; Barnard, 1925, Ann. So. Afr. Mus., 21: 183; Bigelow and Welsh, 1925, Bull. U. S. Bur. Fish., 40, (1), p. 84, fig. 35; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 58, pl. 2, fig. 2; Parr, 1932, Bull. Bingham Oceanogr. Coll., 3, (5), p. 37; Noronha and Sarmento, *1934, Peixes Madeira, p. 166; Nobre, 1935, Fauna Marinha Portugal, 1: 390; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 265, fig. 123; Bruun, 1936, Bull. Inst. Océanogr. Monaco, 700: 5; 1937, Dana Rep., 9: 4; Coelho, 1942, Trav. Stat. Biol. Marit. Lisbonne, 46: 8; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 517, figs. 165, 166; Smith, 1949, Sea Fishes So. Afr., p. 386, fig. 1089; Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 158, fig. 72; Scholander and Van Dam, 1953, Biol. Bull., 104: 76; 1954, op. cit., 107: 249; Poll, 1953, Rés. Sci. Exp. Océanogr. Belge (1948–1949), 4, (2), (3), p. 154, fig. 63; Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 192; Marshall, 1954, Aspects Deep Sea Biol., pl. 3.

Nettophichthys retropinnatus Holt, *1891, Sci. Proc. Roy. Dublin Soc., 7: 122; Holt and Calderwood, 1895, Trans. Roy. Dublin Soc., 5: 511, pl. 41, fig. 2.

Leptocephalus Synaphobranchi pinnati Murray and Hjort, 1912, Depths of Ocean, p. 751, fig. 549; Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 12, pl. 2, figs. 1-4, text figs. 5-9; Barnard, 1925, Ann. So. Afr. Mus., 21: 218; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 54.

Synaphobranchus pinnatus var. *parvipinnis* Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 4; 1919, Rés. Camp. Sci. Monaco, 52: 99, pl. 6, fig. 3; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 3.

Synaphobranchus kaupi Bruun, 1937, Dana Rep., 9: 4, figs. 1, B, 2, 3, 5-9, 14, 17; Beebe, 1937, Zoologica, 22: 202; Norman and Trewavas, 1939, Ann. Mag. Nat. Hist., (11), 3: 355; Longley and Hildebrand, 1941, Pap. Tortugas Lab., 34: 16; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 52; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 58, chart 4.

Deep-abyssal records.—?Mid-Atlantic, ca. 31° N., 42° W., 3465 meters, one specimen.¹

Eastern Atlantic off the Cape Verde Islands, 3200 meters, two specimens.

Eastern Atlantic off the Azores, 2235, 2220 meters, two specimens.

Eastern Atlantic off Morocco, 2210, 2200 meters, twelve specimens in two hauls.

Eastern Atlantic, ca. 35° N., 8° W., 2150-2300 meters, twenty-four specimens in one haul.

Eastern Atlantic south of Iceland, ca. 62° N., 19° W., 2150 meters, one specimen.

Eastern Atlantic off Morocco and the Canary Islands, 2015-2115 meters, fifteen specimens in five hauls, one to eight per haul.

Eastern Atlantic, ca. 38° N., 25° W., 1998 meters, one specimen.

Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, three specimens.

Western Atlantic off United States coast, 39°-40° N., 2654, 2258, 2250, 2102, 2084, 1997 meters, an unstated number of specimens from six hauls.

Western Atlantic, Gulf of Mexico, 2104-2194 meters, four specimens (*Oregon* Station 1303, 28° 47' N., 87° 50' W., May 26, 1955).

¹ This record (Zugmayer, 1911, p. 84) from Monaco Station 2108 may be an error. Neither Prince Albert I (1932, p. 40) nor Richard (1934, p. 333) mentioned the species in their notes on the catch made at that station.

Distribution.—Atlantic from Davis Strait (ca. 66° N.) to Brazil in the west and from ca. 62° N., 19° W. to ca. 5° S., 11° E. in the east; many specimens reported, more than seventy-one from deep-abyssal waters, others in 236–1805 meters. South Africa off Cape Point, Agulhas Bank and East London, an unstated number of specimens, 732–1025 meters. Reaching deep-abyssal waters but with the center of distribution probably between 800 and 2000 meters.

Length.—115–813 mm. Leptocephali 20–131 mm.

Remarks.—The specimens considered here are all from the Atlantic and off South Africa. Of the several Indo-Pacific forms that have been considered synonyms of *S. kaupi* by some authors, only *S. brevidorsalis* is known from deep-abyssal waters.

The example recorded by Günther (1887, p. 254) from 1200 fathoms off the coast of Brazil was actually caught at only about 700 fathoms, or 1280 meters (Thomson and Murray, 1895, p. 368).

Synaphobranchus brevidorsalis Günther

Synaphobranchus brevidorsalis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 255 (part), pl. 63, fig. C—Pacific north of New Guinea, ca. 1° S., 144° E., 1956 meters.

Synaphobranchus brevidorsalis Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 134; 1908, op. cit., 15, (2), p. 160; Weber, 1913, Monogr. Siboga Exp., 57: 55; Weber and de Beaufort, 1916, Fishes Indo-Austr. Arch., 3: 335, fig. 163; Norman and Trewavas, 1939, Ann. Mag. Nat. Hist., (11), 3: 358; Matsubara and Ochiai, 1951, Jap. Jour. Ichth., 1: 251, fig. 4, c.

Synaphobranchus pinnatus var. *brevidorsalis* Lloyd, 1909, Mem. Indian Mus., 2: 152, pl. 47.

Synaphobranchus (*Synaphobranchus*) *brevidorsalis* Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 45.

Deep-abyssal records.—Western Pacific north of New Guinea, 1956 meters, the type.

Western Pacific, ca. 2° S., 130° E., 1914 meters, two specimens.

Distribution.—Western Pacific, two deep-abyssal records, one specimen from the Banda or Celebes Sea, depth data lost, and one from Japan, depth unknown. Indian Ocean in the Arabian Sea, near the Maldive Islands and near Zanzibar, three specimens in 1789 meters, one in 1534 meters, one in 914–1463 meters, and three in 693 meters.

Length.—155–705 mm.

Remarks.—The species is believed by some authors to be a form of *S. kaupi*.

Family SERRIVOMERIDAE

Serrivomerids, a family of little-known bathypelagic eels, are found on both sides of the northern Atlantic, in the eastern and central Pacific, and in the Indian Ocean. It would not be surprising if some of them should eventually prove to belong to the deep-abyssal fauna.

Serrivomer parabeani Bertin. Table 9.

Serrivomer parabeani Bertin, 1940, C. R. Acad. Sci. Paris, **211**: 76—Atlantic, type locality not stated, here designated as Monaco Station 3281, ca. 39° N., 35° W., locality of specimen described and figured by Roule and Angel, 1933, p. 71, pl. 4, fig. 33 (*Paraserrivomer hasta*, not of Zugmayer).

Serrivomer Murray and Hjort, 1912, Depths of Ocean, pp. 85, 93, 108, 755.

Serrivomer sector Murray and Hjort, 1912, op. cit., pp. 605, 612, 630.

Serrivomer sector longidentatus Roule and Bertin, 1929, Oceanogr. Rep. Danish Dana Exp. 1920–22, **4**: 59 (part).

Paraserrivomer hasta Roule and Angel, 1931, Bull. Inst. Océanogr. Monaco, **581**: 3; 1933, Rés. Camp. Sci. Monaco, **86**: 70, pl. 4, fig. 4; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 1210 (part); Belloc, 1949, Bull. Inst. Océanogr. Monaco, **958**: 4; ?Brandes, Kotthaus and Krefft, 1954, Cons. Perm. Intern. Explor. Mer, Ann. Biol., **9**: 48.

Nettastoma hasta Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 281 (part).

Serrivomer beani Beebe and Crane, 1936, Zoologica, **20**: 61 (part).

Serrivomer hasta Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, **7**, (1), p. 33; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., **11**: 550, pl. 9, fig. 2.

Serrivomer parabeani Bertin, 1944, Bull. Mus. Hist. Nat. Paris, **16**: 106, fig. 2, *c*; Bauchot-Boutin, 1953, op. cit., **25**: 366; 1954, op. cit., **26**: 304; Bauchot-Boutin, in Koefoed, 1955, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (2), (4), p. 11.

Distribution.—Eastern Atlantic, ? ca. 63° N., 11° W. and in 28°–57° N. Mid-Atlantic, 31°–40° N. Western Atlantic off Bermuda and in 40°–43° N. Perhaps chiefly deep-abyssal. Extreme depth range 300–4500 meters.

Length.—115–695 mm.

Remarks.—In a key to the species of *Serrivomer* based on *Dana* material, Bauchot-Boutin (1953, p. 366) included the Pacific and Indian oceans in the range of this species.

Serrivomer sector Garman. Table 10.

Serrivomer sector Garman, 1899, Mem. Mus. Comp. Zool., **24**: 320, pl. 63—one station in the Gulf of California in 1280 meters and nine in the Gulf of Panama (ca. 3° N., 82° W. to ca. 7° N., 79° W.) in 245, 1409 and 1865–3240 meters (type locality not designated).

Serrivomer beanii Gilbert, 1905, Bull. U. S. Fish Comm., 23: 586.

Serrivomer sector Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 132, pl. 8; Lloyd, 1909, Mem. Indian Mus., 2: 152; Weber and de Beaufort, 1916, Fishes Indo-Austr. Arch., 3: 332, figs. 159, 160; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 12; Beebe and Crane, 1936, Zoologica, 20: 36; Bertin, 1944, Bull. Mus. Hist. Nat. Paris, 16: 106; Bauchot-Boutin, 1953, op. cit., 25: 366, fig. 1; 1954, op. cit., 26: 303, 305.

Serrivomer sector longidentatus Roule and Bertin, 1929, Oceanogr. Rep. Danish Dana Exp. 1920-22, 4: 40 (part).

?*Serrivomer microps* Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 33.

Distribution.—Indian Ocean from the Arabian Sea and off Sumatra (ca. 0° 58' S., 99° E.) to ca. 26° S., 93° E. in the east and ca. 4° N., 48° E. in the west. Mid-Pacific off the Hawaiian Islands. Eastern Pacific in the Gulf of Panama, the Gulf of California, and off Lower California. Too few specimens to determine the center of distribution, perhaps in 1400-2400 meters (Table 10). Extreme depth range 245-3240 meters.

Length.—82-580 mm.

Remarks.—Norman (1939, p. 33) included this species in the synonymy of *Serrivomer microps* Alcock. In three brief papers, preliminary to a revision of the genus *Serrivomer*, neither Bertin (1944, p. 106) nor Bauchot-Boutin (1953, p. 366 and 1954, p. 305) included *microps* in their keys to the genus. The species *microps* was described as *Gavialiceps microps* by Alcock (1889, p. 461; 1892, p. 364; 1899, p. 191), who reported it from three hauls in the Bay of Bengal and the Arabian Sea in 1588-1670, 1650 and 1911 meters. Under the name *Serrivomer microps*, Norman (1939, p. 33) recorded one specimen from the Laccadive Sea in 2505 meters, one from near Zanzibar in 1207-1463 meters, and one from an unknown depth near the Maldive Islands.

Family NEMICHTHYIDAE

Several species of this widely distributed bathypelagic family, especially those of the genus *Avocettina*, have been recorded from deep-abyssal waters, but such records are not frequent enough to warrant placing the habitat at these depths, with the possible exception of *Avocettina infans* Günther.

Avocettina infans Günther. Table 11.

Nemichthys infans Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 251—Atlantic, ca. 5° N., 14° W., 4571 meters.

Labichthys elongatus Gill and Ryder, 1883, Proc. U. S. Nat. Mus., 6: 262; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 263; Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 656; Goode and Bean, 1895, Ocean. Ichth., p. 153, fig. 172; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 369.

Nemichthys infans Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 264, pl. 63, fig. B.

Avocettina infans Jordan and Davis, 1891, Rep. U. S. Comm. Fish, 1888: 655; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 367; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 129, pl. 8, figs. 5, 6; 1908, op. cit., 15, (2), p. 171; Weber, 1913, Monogr. Siboga Exp., 57: 53; Weber and de Beaufort, 1916, Fishes Indo-Austr. Arch., 3: 334; Roule and Bertin, 1924, Bull. Mus. Hist. Nat. Paris, 30: 63; 1929, Oceanogr. Rep. Danish Dana Exp. 1920-22, 4: 7, 23, pl. 1, fig. 2, text figs. 10-12 (part); 1931, Faune Ichth. Atl. Nord, 8, fig.; Barnard, 1925, Ann. So. Afr. Mus., 21: 199; Forrest, *1927, N. West. Nat. Arbroath, 2: 248, fig.; Norman, 1930, Disc. Rep., 2: 338; Roule and Angel, 1931, Bull. Inst. Océanogr. Monaco, 581: 3; 1933, Rés. Camp. Sci. Monaco, 86: 69; ?Parr, 1932, Bull. Bingham Oceanogr. Coll., 3, (5), p. 15, fig. 7; Beebe, 1936, Zoologica, 21: 201; ?1937, op. cit., 22: 202; Beebe and Crane, 1936, op. cit., 20: 61; 1937, op. cit., 22: 367; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 283, 1211, fig. 133; 1942, Arq. Zool. São Paulo, 3: 136; Chapman, 1940, Occ. Pap. British Columbia Prov. Mus., 2: 14; Smith, 1949, Sea Fishes So. Afr., p. 391; Koumans, 1953, Temminckia, 9: 196.

Labichthys infans Goode and Bean, 1895, Ocean. Ichth., p. 153, figs. 173, 174.

Avocettina elongata Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2802.

Gavialiceps tinrayei Zugmayer, 1914, Bull. Inst. Océanogr. Monaco, 288: 3; Roule and Bertin, 1929, Oceanogr. Rep. Danish Dana Exp. 1920-22, 4: 59; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 4.

?*Avocettina* sp. Beebe and Crane, 1937, Zoologica, 23: 369, figs. 10-16.

Distribution.—Eastern Atlantic off Wales and from ca. 34° to 0° 26' N. Mid-Atlantic, ca. 31° N., 41° W. Western Atlantic from 39° N. to 8° S. South Africa off Cape Point. South Atlantic, three localities: ca. 34° S., 16° W.; 39° S., 36° W.; and 41° S., 42° W. North Indian Ocean, 0° 39' to 13° S., 41° to 98° E. Western Pacific around the Dutch East Indies. Number of specimens insufficient to determine the center of distribution, perhaps 1400-2600 meters. Extreme depth range 600-4571 meters.

Length.—140-604 mm.

Remarks.—Although *A. infans* is a bathypelagic fish, Günther (1887, p. 264) reported a specimen found attached to a cable brought up from 1489 meters.

Family CYEMIDAE

Cyema atrum Günther. Table 12.

Cyema atrum Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 251—Challenger Stations 158 (ca. 50° S., 123° E.) and 295 (ca. 38° S., 94° W.), 3291 and 2744 meters (type locality not designated).

Cyema atrum Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 265, pl. 54, fig. D; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 91, pl. 7, fig. 4; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 135; Goode and Bean, 1895, Ocean. Ichth., p. 154, fig. 176; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 131, pl. 8, fig. 3; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 85, pl. 4, fig. 2; Zugmayer, in Roule and Angel, 1933, op. cit., 86: 85; Murray and Hjort, 1912, Depths of Ocean, pp. 87, 605, 612, 665, figs. 69, 460, 490; Nusbaum-Hilarowicz, 1923, Rés. Camp. Sci. Monaco, 65: 75, pl. 3, fig. 11, pl. 10, figs. 5–11; Roule and Angel, 1924, Bull. Inst. Océanogr. Monaco, 451: 7; 1930, Rés. Camp. Sci. Monaco, 79: 115, pl. 6, fig. 151; Roule and Bertin, 1924, Bull. Mus. Hist. Nat. Paris, 30: 65; *1929, C. R. Soc. Biol. Paris, C, (4), p. 264; 1929, Oceanogr. Rep. Danish Dana Exp. 1920–22, 4: 52, 101, pl. 9, figs. 1–10, text figs. 35, 36, 55–77; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 12; Trewavas, 1933, Proc. Zool. Soc. London, p. 601, pl. 1, text figs. 1–3; Beebe, 1934, Nat. Geogr. Mag., 66: 698, pl. 14; 1937, Zoologica, 22: 202; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 287, figs. 136, 137; Bertin, 1936, Bull. Soc. Zool. France, 61: 440, figs. 1–5; 1937, Dana Rep., 10: 3, figs. 1–24; Roule, 1937, Bull. Inst. Océanogr. Monaco, 726: 7; Tchernavin, 1947, Jour. Linn. Soc. London, 41: 345; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 553, pl. 9, fig. 3; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 50; Marshall, 1954, Aspects Deep Sea Biol., p. 225, fig. ix-5; Kofoed, 1955, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), (4), p. 10; Grey, 1955, Fieldiana, Zool., 37: 291.

Leptocephalus sp. Murray and Hjort, 1912, Depths of Ocean, p. 93, fig. 79.

Leptocephalus Cyematis atri Lea, 1913, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 3, (1), p. 16, pl. 2, fig. 6, text fig. 11.

Leptocephalus F Roule, 1914, Bull. Inst. Océanogr. Monaco, 292: 9, figs. 5, 6; 1919, Rés. Camp. Sci. Monaco, 52: 105, pl. 7, fig. 6.

Cyema Hollister, 1930, Bull. N. Y. Zool. Soc., 33: 73, fig.

Distribution.—Eastern Atlantic from 37° to 28° N. and off the African coast in 23° and 30° S. Mid-Atlantic from ca. 39° N., 39° W. to ca. 7° S., 8° W. Western Atlantic, Bermuda to ca. 8° N., 44° W. Pacific off Lower California; in ca. 4° S., 116° W.; southwest of Juan Fernandez Island; and northeast of New Zealand, off the Kermadec Islands. Indian Ocean off the Seychelles, the Maldives, south of Sumatra, and in the southern ocean at ca. 50° S., 123° E. Probably chiefly deep-abyssal as an adult, leptocephali usually at higher levels. Extreme depth range of adult 800–5100 meters.

Length.—68–130 mm. Leptocephali 10–62 mm.

Remarks.—*C. atrum* is bathypelagic and the only species of the family.

Family HALOSAURIDAE

Of the twenty described species, eight have been reported from the deep-abyssal zone. All are benthic deep-sea fishes, almost cosmopolitan in distribution between Lat. 40° N. and 46° S. *Aldrovandia rostrata* has also been reported from below 3660 meters. Only *A. macrochir* can be said to prefer deep-abyssal waters.

Halosaurus johnsonianus Vaillant

Halosaurus johnsonianus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 31, 181, pl. 15, fig. 2—Atlantic off Soudan, Talisman Station 81, 1139 meters (see footnote, p. 110).

Halosaurus johnsonianus Goode and Bean, 1895, Ocean. Ichth., p. 131, fig. 153; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 143, pl. 4, fig. 20; Vaillant, in Roule, 1919, op. cit., 52: 130; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 67; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 250, fig. 117; Bertin and Estève, 1951, Cat. Types Poiss., 6: 32; Tucker, 1954, Bull. Brit. Mus. (Nat. Hist.), Zool., 2: 192.

Deep-abyssal records.—Eastern Atlantic off Morocco, 2115, 2104 meters, six specimens in one haul, three in the other.

Distribution.—Eastern Atlantic only, off the Azores, Morocco, Soudan, and the Canary Islands, two deep-abyssal records and 109 specimens reported from sixteen hauls in 834–1590 meters. Perhaps only accidental in deep-abyssal waters.

Length.—200–408 mm.

Halosaurus attenuatus Garman

Halosaurus attenuatus Garman, 1899, Mem. Mus. Comp. Zool., 24: 296, pl. 60, fig. 1—Pacific near the Galapagos Islands, ca. 2° N., 92° W., 2488 meters.

?*Halosaurus attenuatus* Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 11.

Deep-abyssal record.—Eastern Pacific, 2488 meters, the type.

Distribution.—Eastern Pacific, one deep-abyssal specimen and one damaged example, doubtfully identified with this species, off Lower California in 1180 meters.

Length.—406 mm.

Aldrovandia rostrata Günther

Halosaurus rostratus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 252—Mid-Atlantic, ca. 35° N., 50° W., 5029 meters.

Halosaurus rostratus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 241, pl. 59, fig. D; von Lendenfeld, 1887, op. cit., p. 283, pl. 73, figs. 54-64.

Aldrovandia rostrata Goode and Bean, 1895, Ocean. Ichth., p. 132, fig. 154; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 609.

Halosauropsis rostratus Roule, 1919, Rés. Camp. Sci. Monaco, 52: 29; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 252, fig. 118.

?*Aldrovandia* sp. Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 60.

Deep-abyssal record.—Mid-Atlantic west of the mid-Atlantic ridge, 5029 meters, the type.

Distribution.—Eastern Atlantic, ca. 15° N., 23° W., one specimen, 1311 meters. Mid-Atlantic, one specimen from deep-abyssal waters. Western Atlantic off the Bahama Islands, four specimens in 1645-1729 meters, identification not certain.

Length.—?—508 mm.

Aldrovandia affinis Günther. Table 13.

Halosaurus affinis Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 444—Pacific south of Japan, ca. 34° N., 138° E., 1034 meters.

Halosaurus affinis Bleeker, *1877-78, Verh. Akad. Amsterdam, 18: 21; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 241, pl. 59, fig. B; Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 309; 1891, op. cit., (6), 7: 11; Gilchrist, 1906, Mar. Invest. So. Afr., 4: 171; Weber, 1913, Monogr. Siboga Exp., 57: 93; Thompson, *1916, Prov. Cape Good Hope Mar. Biol. Rep., 3: 84; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 10.

Halosaurus anguilliformis Alcock, 1889, Ann. Mag. Nat. Hist., (6), 4: 453; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 184.

Halosaurus Hoskynii Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 309; 1891, op. cit., (6), 7: 11; 1892, Ill. Zool. Investigator, Fishes, pl. 7, fig. 3.

Aldrovandia affinis Goode and Bean, 1895, Ocean. Ichth., p. 516; Barnard, 1925, Ann. So. Afr. Mus., 21: 167; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 46; Smith, 1949, Sea Fishes So. Afr., p. 111, fig. 171.

Aldrovandia hoskynii Goode and Bean, 1895, Ocean. Ichth., p. 516.

Aldrovandia anguilliformis Goode and Bean, 1895, loc. cit.

Halosauropsis affinis Weber and de Beaufort, 1922, Fishes Indo-Austr. Arch., 4: 5.

Deep-abyssal records.—South Africa off Cape Point, 2560 meters, three specimens; 2195 meters, eight specimens; 1847 meters, two specimens.

North Indian Ocean, ca. 11° N., 74° E., 1829 meters, four specimens.

Distribution.—South Africa, off Cape Point, three deep-abyssal records and six specimens in 914–1381 meters. Indian Ocean in the Laccadive Sea, the Gulf of Manaar, near the Maldive Islands and off Zanzibar, one deep-abyssal record and at least three specimens in 1170–1789 meters. Western Pacific south of Japan and in the Timor Sea, four specimens, 883–1034 meters.

The fact that more than two specimens per haul have been found only in deep-abyssal waters suggests that the species may be found chiefly in this area. However, it has been caught too rarely for its habitat to be determined with certainty.

Length.—310–533 mm.

Aldrovandia gracilis Goode and Bean

Aldrovandia gracilis Goode and Bean, 1895, Ocean. Ichth., p. 134, fig. 157—
Gulf of Mexico, 2615 meters.

Aldrovandia gracilis Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47:
610; 1900, op. cit., fig. 263; Zugmayer, in Roule and Angel, 1933, Rés.
Camp. Sci. Monaco, 86: 81.

Deep-abyssal records.—Gulf of Mexico, 2615, 2434 meters, two specimens.

Distribution.—Western Atlantic in the Gulf of Mexico, off Guadeloupe Island, and in ca. 42° N., 63° W., two deep-abyssal specimens and two in 1408 and 1380 meters.

Length.—?–490 mm.

Aldrovandia pallida Goode and Bean

Aldrovandia pallida Goode and Bean, 1895, Ocean. Ichth., p. 135, fig. 158
—Gulf of Mexico, 1747 meters.

Aldrovandia pallida Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47:
611.

Deep-abyssal records.—Gulf of Mexico, 2615, 2434 meters, an unstated number of specimens from two hauls.

Distribution.—Western Atlantic only, Gulf of Mexico and 36°–41° N., 65°–74° W., two records from deep-abyssal waters and an unstated number of specimens from seven hauls, three of them between 1747 and 1765 meters, two in 1569 and 1514 meters, and two in 1268 and 1241 meters.

Length.—?–600 mm.

Aldrovandia macrochir Günther. Table 14.

Halosaurus macrochir Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 250—type locality not stated, here designated as *Challenger* Station V, Atlantic off Strait of Gibraltar, 1994 meters, the locality of the figured specimen in Günther, 1887.

Halosaurus macrochir Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 219; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 232, 237, pl. 59, fig. A, pl. 60, figs. 1–8; von Lendenfeld, 1887, op. cit., p. 283, pl. 73, figs. 45–48; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 170, pl. 16, fig. 2.

Halosaurus goodei Gill, 1883, Proc. U. S. Nat. Mus., 6: 257; Böhlke, 1953, Stanf. Ichth. Bull., 5: 51.

Aldrovandia macrochira (*macrochir* of authors) Goode and Bean, 1895, Ocean. Ichth., p. 133, fig. 155; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 609; 1900, op. cit., fig. 262; Barnard, 1925, Ann. So. Afr. Mus., 21: 168; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 81; Lozano Rey, 1947, Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat., 11: 585, pl. 11, fig. 2, text fig. 170; Smith, 1949, Sea Fishes So. Afr., p. 111.

Aldrovandia goodei Goode and Bean, 1895, Ocean. Ichth., p. 133; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 610.

Halosauropsis macrochir Collett, 1896, Rés. Camp. Sci. Monaco, 10: 146, pl. 4, fig. 23; Zugmayer, 1911, op. cit., 35: 12; Murray and Hjort, 1912, Depths of Ocean, pp. 121, 396, fig. 103, b; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 29; Vaillant, in Roule, 1919, op. cit., p. 130; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 65, pl. 4, fig. 7, text figs. 14, 15; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 253, fig. 119; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 6, (16), p. 54.

Halosaurus niger Gilchrist, 1906, Mar. Invest. So. Afr., 4: 170, pl. 51; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 10.

Distribution.—Eastern Atlantic from ca. 50° N., 11° W. to the Azores and the Canaries, and west to ca. 34° N., 33° W. Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W. Western Atlantic, 17°–41° N., 65°–76° W. South Africa off Cape Point. South Indian Ocean near Marion Island. Primarily a deep-abyssal species, extreme depth range 1163–3166 meters. Center of distribution probably in about 1800–2400 meters (Table 14).

Length.—120–650 mm.

Aldrovandia phalacra Vaillant

Halosaurus phalacrus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 185, pl. 15, fig. 3, pl. 16, fig. 1—Atlantic off the Azores, *Talisman* Station 121, 1442 meters (see footnote, p. 110).

Aldrovandia phalacra Goode and Bean, 1895, Ocean. Ichth., p. 134, fig. 156.

Halosaurus phalacrus Brauer, 1906, *Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia*, **15**, (1), p. 253; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, **35**: 11; Roule, 1919, *op. cit.*, **52**: 28; Vaillant, in Roule, 1919, *op. cit.*, p. 130.

Halosauropsis phalacrus Fowler, 1936, *Bull. Amer. Mus. Nat. Hist.*, **70**: 254; Nybelin, 1948, *Göteborgs K. Vetensk. Vitt.-Samh. Handl.*, (B), **5**, (16), p. 58; Bertin and Estève, 1951, *Cat. Types Poiss.*, **6**: 33.

Aldrovandia phalacrus Lozano Rey, 1947, *Mem. R. Acad. Cien. Madrid, Ser. Cien. Nat.*, **11**: 587, pl. 11, fig. 3.

Deep-abyssal records.—Eastern Atlantic, ca. 43° N., 9° W., 2320 meters, one specimen.

Eastern Atlantic off the Azores, 2220 meters, one specimen.

Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 meters, seven specimens in one haul.

Eastern Atlantic off Morocco, 2190, 2104 meters, two specimens.

Distribution.—Eastern Atlantic from ca. 43° N., 9° W. and off the Azores to ca. 16° N., 23° W., five deep-abyssal records and fourteen specimens from eight hauls in 1103–1786 meters. North Indian Ocean, ca. 1° N., 45° E., one specimen, 1644 meters.

Length.—250–480 mm.

Family NOTACANTHIDAE

Only four of the nineteen established species of notacanth fishes have been recorded from deep-abyssal waters, and none of the four is represented by more than two specimens. The family is distributed throughout the world except in the Antarctic.

Macdonaldia sp. Koefoed

Macdonaldia sp. Koefoed, 1927, *Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp.* 1910, **4**, (1), p. 71, pl. 4, fig. 2—Atlantic, ca. 34° N., 33° W.

Macdonaldia sp. Trotti, 1942, *Ann. Mus. Civ. Stor. Nat. Genova*, **61**: 278.

Deep-abyssal record and distribution.—Eastern Atlantic, 2615 meters, one specimen.

Length.—321 mm.

Remarks.—The specimen may be referable to *M. challengerii* Vaillant or to *M. longus* Gill and Townsend, both of which are Pacific forms. The latter, known only from the type, was caught in Bering Sea at a depth of 1805 meters.

Macdonaldia challengerii Vaillant

Notacanthus challengerii Vaillant, 1888, *Exp. Sci. Trav. Talis.*, Poiss., p. 388
—Pacific off Japan, ca. 34° N., 140° E., 3429 meters.

Notacanthus rissoanus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 250, pl. 61, fig. B.

Macdonaldia challengerii Goode and Bean, 1895, Ocean. Ichth., p. 172; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 617; Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 404; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 72; Trotti, 1942, Ann. Mus. Civ. Stor. Nat. Genova, 61: 278.

Deep-abyssal records and distribution.—Western Pacific, 3429 meters, the type.

North Pacific, Bering Sea, ca. 56° N., 172° W., 2971 meters, one specimen.

Length.—396–508 mm.

Macdonaldia africana Gilchrist and von Bonde

Macdonaldia africana Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 11, pl. 3, fig. 1—off Table Bay, South Africa.

Macdonaldia africana Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 72; Trotti, 1942, Ann. Mus. Civ. Stor. Nat. Genova, 61: 278.

Deep-abyssal record and distribution.—South Africa, 2231 meters, one specimen.

Length.—395 mm.

Remarks.—J. L. B. Smith (1949, p. 110) puts this species in the synonymy of *M. rostrata* Collett, which is known from both sides of the north Atlantic in 923–1797 meters, off South Africa in 1645 meters, and has been taken once off Greenland in 662 meters.

Polyacanthonotus vaillanti Fowler

Polyacanthonotus vaillanti Fowler, 1934, Proc. Acad. Nat. Sci. Philadelphia, 85: 266, fig. 27—Atlantic off United States coast, ca. 38° N., 72° W., 1995 meters.

Notacanthus rissoanus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 335, pl. 27, fig. 1.

Polyacanthonotus rissoanus Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 256 (part).

Polyacanthonotus vaillanti Trotti, 1942, Ann. Mus. Civ. Stor. Nat. Genova, 61: 267.

Deep-abyssal records and distribution.—Eastern Atlantic off Morocco, 2212 meters, one specimen.

Western Atlantic, 1995 meters, the type.

Length.—260–500 mm.

Remarks.—The type specimen, in the United States National Museum, bears a label reading "Station No. 2103," for which the correct data are Lat. 38° 47' 20" N., Long. 72° 37' W., 1091 fathoms (not 42° 04' 30" N., 124° 31' W., 65 fathoms, as stated by Fowler).

Polyacanthonotus altus Gill and Townsend

Macdonaldia alta Gill and Townsend, 1897, Proc. Biol. Soc. Washington, 11: 232—Bering Sea, ca. 54° N., 168° W.

Macdonaldia alta Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2826.

Polyacanthonotus altus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 387.

Deep-abyssal record and distribution.—North Pacific, 2562 meters, one specimen.

Length.—Not stated.

Family MORIDAE

The family Moridae as recently defined by Svetovidov (1948, p. 67) contains seventeen genera and about seventy species, many of them inhabiting deep water. Only three reach the deep-abyssal zone and none can be said to prefer these depths, although *Antimora rostrata* is not rare below 2000 meters. Specimens of the bathypelagic genus *Melanonus* have been taken in nets fishing above as well as below 2000 meters but not in sufficient numbers to warrant its inclusion in the deep-abyssal fauna. *Microlepidium grandiceps* Garman is apparently bathypelagic also.

The family is represented in all temperate, tropical, and boreal seas.

Lepidion lepidion Risso

Gadus lepidion Risso, *1810, Ichth. Nice, p. 118, pl. 11, fig. 40—Mediterranean (Nice).

Lota lepidion Risso, 1826, Hist. Nat. Eur. Merid., 3: 218; Canestrini, *1863, Arch. Zool. Anat. Fis. Genova, 2.

Lepidion rissoi Swainson, *1838, Nat. Hist. Classif. Fishes, 1: 319; Goode and Bean, 1895, Ocean. Ichth., p. 370, fig. 323.

Lepidion rubescens Swainson, *1839, Nat. Hist. Classif. Fishes, 2: 307.

Haloporphyryrus lepidion Canestrini, *1872, Fauna Ital., 3: 157; Giglioli, 1880, Nature, London, 21: 202; Vinciguerra, 1883, Ann. Mus. Civ. Stor. Nat. Genova, 18: 554, pl. 3; 1885, op. cit., 22: 459; 1932, op. cit., 56: 15; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 91; Carus, 1893, Prodr. Faunae Medit., 2: 576; Parona, *1898, Atti Soc. Ligure Sci.

Nat. Geogr., 9; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 134.

Haloporphyrus eques Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 91, pl. 18, fig. B; Holt and Calderwood, 1895, Sci. Trans. Roy. Dublin Soc., (2), 5, (9), p. 446, pl. 39, figs. 1, 2; Koehler, 1896, Ann. Univ. Lyon, 26: 487; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 30, pl. 4, fig. 7; Ehrenbaum, 1902, Fauna Arct., 2: 114; *1936, Naturg. wirtsch. Bedeut. See-fische Nordeur., p. 129; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 24; Saemundsson, *1927, Syn. Fishes Iceland; 1949, Zool. Iceland, 4, (72), p. 71 (further refs., Iceland); Hickling, 1928, Ann. Mag. Nat. Hist., (10), 2: 196; Schnakenbeck, 1933, Faune Ichth. Atl. Nord, 12, fig.; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 174.

Lepidion eques Goode and Bean, 1895, Ocean. Ichth., p. 371; Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 69; Murray and Hjort, 1912, Depths of Ocean, pp. 400, 401, 433, fig. 280; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 124, fig. 50; Norman, 1935, Disc. Rep., 12: 50.

Haloporphyrus lepidion var. *eques* Roule, 1919, Rés. Camp. Sci. Monaco, 52: 78.

Lepidion lepidion Norman, 1935, Disc. Rep., 12: 50; Tortonese and Trotti, 1949, Atti Accad. Ligure Sci. Lett., 6, (1), p. 57.

Deep-abyssal records.—Mediterranean, ca. 43° N., 7° E., 2230, 2170 meters, two specimens, both from traps.

Distribution.—Eastern and north Atlantic from Davis Strait (ca. 63° N.), southwest of Iceland (ca. 64° N.) and the Faroe-Shetland Channel, south to the Gulf of Gascony. Western Mediterranean. Not a deep-abyssal species except in the Mediterranean. Depth range [216] (see Hickling, 1928, p. 196) and 540–1804 meters. Center of distribution probably in about 650–1000 meters, where it has been taken at times in large numbers.

Length.—70–889 mm.

Remarks.—There may be two species included here under the name *Lepidion lepidion*. If distinct, the two forms are closely related and the various records cannot be applied correctly to one or the other from a study of the literature alone.

Antimora rostrata Günther. Table 15.

Haloporphyrus rostratus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 18 —type locality not stated, here designated as *Challenger* Station no. 320, off Montevideo, ca. 37° S., 53° W., 1098 meters, the locality of the specimen figured by Günther (1887).

Haloporphyrus viola Goode and Bean, 1878, Proc. U. S. Nat. Mus., 1: 257; 1879, Bull. Essex Inst., 11: 8; 1883, Bull. Mus. Comp. Zool., 10: 206; Goode, 1880, Proc. U. S. Nat. Mus., 3: 476.

- Antimora viola* Jordan, 1887, Rep. U. S. Fish Comm., 1885: 917; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 94, pl. 15; Goode and Bean, 1895, Ocean. Ichth., p. 372, fig. 324; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 59; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 2544; 1900, op. cit., figs. 893, 893, a; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 30; Ehrenbaum, 1902, Fauna Arct., 2: 115; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; Murray and Hjort, 1912, Depths of Ocean, pp. 121, 400, fig. 279; Waite, 1916, Sci. Rep. Austr. Antarctic Exp. 1911-1914, (C), 3: 76; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 13; Bigelow and Welsh, 1925, Bull. U. S. Bur. Fish., 60, (1), p. 444, fig. 218; McCulloch, 1929-30, Mem. Austr. Mus., 5: 129; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 82; Scholander and van Dam, 1954, Biol. Bull., 107: 249.
- Antimora rostrata* Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 93, pl. 16, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 375; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 122; Zugmayer, in Roule and Angel, 1933, op. cit., 86: 82; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 118, figs. 44-46; Schroeder, 1940, Copeia, p. 236; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 133, fig. 75; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 173; Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 233, fig. 112.
- Antimora microlepis* Bean, 1890, Proc. U. S. Nat. Mus., 13: 38; Goode and Bean, 1895, Ocean. Ichth., p. 531; Gilbert, 1896, Rep. U. S. Comm. Fish., 1893: 456, 473; 1905, Bull. U. S. Fish Comm., 23: 656; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2545; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 487; Gilbert and Burke, 1912, Bull. Bur. Fish., 30: 90; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 16; Schmidt, 1930, Proc. 4th Pac. Sci. Congr., 3: 461; *1931, Akad. Sci. U.S.S.R., Trans. Pac. Comm., 2: 151; Soldatov and Lindberg, 1930, Bull. Pac. Sci. Fish. Inst., 5: 516; Svetovidov, 1948, Fauna U.S.S.R., Fishes, 9, (4), p. 69, pl. 18, fig. 2.
- Antimora rhina* Garman, 1899, Mem. Mus. Comp. Zool., 24: 185.
- Antimora mikrolepis* Franz, 1910, Abh. Bayer. Akad. Wiss., 4, Suppl., p. 29.
- Antimora australis* Barnard, 1925, Ann. Mag. Nat. Hist., (9), 15: 499; 1925, Ann. So. Afr. Mus., 21: 321; Smith, 1949, Sea Fishes So. Afr., p. 138.

Distribution.—North Atlantic from Davis Strait (ca. 64° N.) and 46°-33° N. in the west and from ca. 64° N. to ca. 35° N., 8° W. in the east. Southwestern Atlantic, ca. 37° S., 53° W. South Africa off Cape Point. Southwestern Pacific off Tasmania. Western Pacific off Japan. Mid-Pacific off the Hawaiian Islands. Eastern and North Pacific from the Gulf of Panama (7° N.) northward to Alaska and across Bering Sea (54° N.) to Kamchatka (ca. 52° N., 158° E.). A relatively common species with a wide vertical range (403-2904 meters). Probably not uncommon in deep-abyssal waters but with the center of distribution in ca. 800-1800 meters (Table 15).

Length.—140–610 mm.

Remarks.—Gilchrist and von Bonde (1924, p. 13) listed a number of specimens from four hauls off South Africa. One of these lots, no. 3349, from *Pickle* Station 353, in 318 meters, had been listed earlier as "*Callionymus*" (Gilchrist, 1922, p. 19). In this same list Gilchrist included the following catches that were not mentioned in 1924 by Gilchrist and von Bonde: Station 347, eight specimens in 1225 meters; Station 354, seven specimens in 1145 meters; Station 519, ten specimens in 1098 meters; Station 522, thirteen specimens in 2194 meters; Station 542, one specimen in 1060 meters; and Station 543, one specimen in 1802 meters. These records have been included in Table 15, and the record from 318 meters has been omitted.

***Laemonema melanurum* Goode and Bean**

Laemonema melanurum Goode and Bean, 1895, Ocean. Ichth., p. 363, fig. 316
—Atlantic off northern Florida, 805 meters.

Laemonema melanurum Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., 47: 2557; 1900, op. cit., fig. 905; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 84; ?Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 61.

Deep-abyssal records.—Gulf of Mexico, 2683 meters, (?)specimens.

?Off Bermuda, 2012 meters, one young specimen, doubtfully referred to this species.

Distribution.—Western Atlantic, two deep-abyssal records and an unstated number of specimens from one haul in 1733 meters (ca. 39° N., 69° W.) and from six hauls in 380–805 meters (ca. 11° N., 69° W.; Gulf of Mexico; and 30°–31° N., 79° W.). Eastern Atlantic, ca. 47° N., 7° W., one specimen in 920 meters. Probably accidental in deep-abyssal waters.

Length.—73–330 mm.

Family GADIDAE

The family Gadidae contains both surface and deep-sea forms, but only one species is known from deep-abyssal waters. *Gaidropsarus argentatus* Reinhardt has been omitted from the present discussion. Lütken (1898, p. 29) recorded some young taken at a depth of 2261 meters in Denmark Strait, but this Arctic-north Atlantic species has never otherwise been reported below 1428 meters. It is common down to 400 meters. Lütken's young specimens could have entered the net in intermediate waters.

Geographically, gadids are distributed in all seas but are found chiefly in the northern hemisphere.

Gaidropsarus ensis Reinhardt

Motella ensis Reinhardt, *1838, Vidensk. Selsk. Skr. Nat. Math. Afh., 7: 116, 128—off Umanak, Greenland, from seal stomach.

Onos (*Onus* of authors) *ensis* Gill, 1862, Proc. Acad. Nat. Sci. Philadelphia, 15: 241; Collett, 1880, Norske Nordhavs Exp. 1876-78, Zool., 3: 134; *1891, Vidensk. Selsk. Forh., 1891, (11), p. 16; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 98; Goode and Bean, 1895, Ocean. Ichth., p. 381, fig. 327; Ehrenbaum, 1902, Fauna Arct., 2: 114; Zugmayer, in Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 84; Schnakenbeck, 1933, Faune Ichth. Atl. Nord, 12, fig.

Motella ensis Collett, *1878, Vidensk. Selsk. Forh., 1878, (17); Lütken, 1882, Vidensk. Medd. Dansk. naturh. Foren., 1881: 232, 236.

Onus rufus Gill, 1883, Proc. U. S. Nat. Mus., 6: 259.

Gaidropsarus ensis Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2558; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 166, pl. 4, fig. a; Svetovidov, 1948, Fauna U.S.S.R., Fishes, 9, (4), p. 88.

Onogadus ensis de Buen, 1934, Bol. Soc. Esp. Hist. Nat., 34: 500.

Deep-abyssal records.—Western Atlantic off United States coast, 39°-40° N., 2022 meters, one and (?)specimens from two hauls.

Western Atlantic off United States coast, ca. 39° N., 1908, 1977 meters, two hauls, number of specimens not stated.

Distribution.—Western Atlantic, four deep-abyssal records in ca. 39°-40° N.; and from ca. 65° N. to 74° N. (Baffin Bay), three specimens from an unknown depth, five in 360-500 meters and sixty-five from three hauls made in 1200, 1500 and 1600 meters. Perhaps deep-abyssal in the southern part of its range.

Length.—310-400 mm.

Remarks.—The specimen reported by Zugmayer (1933, p. 84) from near Halifax in 25 meters should be re-examined.

Family MACROURIDAE

Macrourids, the most characteristic and abundant of all benthic deep-sea fishes, are found in all seas and at all depths, with the conspicuous exception of the Polar Basin. Apparently the only macrourids reported from waters of negative temperatures are three Antarctic species, all of them deep-abyssal: *Nematonurus lecointei* Dollo, one specimen reported at a temperature of 31° F., the type in +0.5° C.; *Chalinura ferrieri* Regan, 31.9° F. and -0.3° C.; and *C. whitsoni* Regan, 31.9° F. and -0.2° C.

Including the ten from the abyssal plain, fifty-four species have been recorded from deep-abyssal waters; only about nine of these species seem to prefer this zone. Twenty-two species are known only at these great depths but from too few specimens for evaluation. Nybelin (1951, pp. 13, 14) also reported seven specimens of *Chalinura*, perhaps representing a new species, from depths between 4255 and 4872 meters in the eastern Atlantic (ca. 29° N., 17° W. and ca. 22° N., 23° W.).

Nematonurus firmisquamis Gill and Townsend is omitted from the list of deep-abyssal species since no authority has been found for Brauer's listing of the type from 3239 meters (1771 fathoms) (Brauer, 1906, p. 390). The type description contains no station number and no information on depth of capture, nor are there any such data with the type specimen, which is deposited in the United States National Museum. Since the species has been recorded only once again (Evermann and Goldsborough, 1907, p. 349), also from Bering Sea, at a depth of 35 meters, still more doubt attends the truth of Brauer's listing.

Brauer (loc. cit.) also listed in 3239 meters *N. magnus* Gill and Townsend, a species since synonymized with *N. pectoralis* Gilbert. Again no authority has been found for this depth. *N. pectoralis* is a north Pacific species known from several specimens taken in depths ranging between about 180 and 1600 meters.

Jensen (1948, p. 180) has disproved the one deep-abyssal record of *Macrourus fabricii* Sundevall (*Macrourus berglax* Lacépède).

Lyconus pinnatus Günther (1887, p. 158) has also been omitted from the present discussion because the three small (25–41 mm.) specimens taken from nets fished in the deep-abyssal zone were caught in mid-water. Some young macrourids are known to be bathypelagic.

The following two species, having been caught only in nets fishing far above bottom, are apparently adapted for life in intermediate waters as adults also. Neither one can be placed with certainty in the deep-abyssal zone, owing to their infrequent capture.

Cynomaerurus pirei Dollo, Antarctic, South Atlantic, and South Indian, seven specimens, 1025–2000 meters. Length 73–300 mm.

Odontomaerurus murrayi Norman, North Indian Ocean, Arabian Sea, one specimen in 2500 meters. Length ca. 550 mm.

Generic names used in this paper for species of the *Macrourus-Coryphaenoides* group are principally after Gilbert and Hubbs (1916, 1920) and Parr (1946). The taxonomic complexities of these genera

are beyond the scope of a study undertaken on the basis of the literature alone.

Bathygadus melanobranchus Vaillant

Bathygadus melanobranchus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 31, 206, pl. 18, fig. 1—Atlantic off North Africa and the Canary Islands (type locality not designated; see footnote, p. 110).

Bathygadus melanobranchus Goode and Bean, 1895, Ocean. Ichth., p. 424; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 188; Holt and Byrne, 1908, Rep. Fish. Ireland 1906, Sci. Invest., 5: 57; Murray and Hjort, 1912, Depths of Ocean, pp. 399, 769, fig. 563; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 89; Gilbert and Hubbs, 1920, Bull. U. S. Nat. Mus., 100, (1), p. 388; Farran, 1924, Proc. Roy. Irish Acad., B 36: 120, fig. 9; Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 12; Barnard, 1925, Ann. So. Afr. Mus., 21: 334; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 113; Schnakenbeck, 1932, Faune Ichth. Atl. Nord, 12, fig.; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 62; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 451, fig. 220; Smith, 1949, Sea Fishes So. Afr., p. 136.

Deep-abyssal records.—South Africa off Cape Point, ca. 33° S., 16° E., 2560, 2195 meters, eight specimens in two hauls.

Distribution.—Eastern Atlantic, 15°–51° N., 7°–33° W., 231 specimens known from thirty-four hauls, 830–1700 meters. South Africa off Cape Point and Table Bay, ca. 31°–33° S., 16° E., eight deep-abyssal specimens and ten in 1225 meters; off Natal, ca. 30° S., 31° E., twenty-seven specimens, 940 meters. Center of distribution in 800–1400 meters. Probably accidental in deep-abyssal waters.

Length.—132–440 mm.

Remarks.—*B. melanobranchus* is very close to, if not identical with, the Indo-Pacific species *B. furvescens* Alcock, and the South African examples listed above might belong to either species. Gilchrist and von Bonde (1924, p. 12) followed Brauer (1906, p. 272) in placing *furvescens* in the synonymy of *melanobranchus* and did not describe their specimens. The two forms have a similar vertical distribution, although *furvescens* has been taken at times above 800 meters.

Bathygadus favosus Goode and Bean

Bathygadus favosus Goode and Bean, 1886, Bull. Mus. Comp. Zool., 12: 160—Atlantic off Martinique, 863 meters.

Bathygadus favosus Goode and Bean, 1895, Ocean. Ichth., p. 420, fig. 352; Jordan and Everman, 1898, Bull. U. S. Nat. Mus., 47: 2565; 1900, op. cit., fig. 908; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), p. 12, fig. 4.

Bathygadus sp. (*favosus*?) Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 114.

Deep-abyssal record.—Gulf of Mexico, 2745 meters, one young specimen.

Distribution.—Western Atlantic in the Caribbean near Martinique, five specimens in two hauls in 863 and 1249 meters; in the Gulf of Mexico, one deep-abyssal record and an unstated number of specimens from two hauls in 768 and 1324 meters. ?Eastern Atlantic, ca. 35° N., 7° W., 1615 meters, a specimen in poor condition doubtfully referred to this species.

Length.—215–350 mm.

Remarks.—Goode and Bean (1895, p. 421) were apparently in error when they stated that the type of this species was taken at Blake Station 80, although their data are otherwise correct. According to a written communication from the Museum of Comparative Zoology the label with the type specimen reads "Off Martinique, 472 fathoms. Coll. Blake Exp. 1878–79." In the station lists compiled by Sanderson Smith (1888, p. 964) only Station 200 was at a depth of 472 fathoms off Martinique. Station 80 was northwest of Cuba in 1222 fathoms.

***Gadomus longifilis* Goode and Bean**

Bathygadus longifilis Goode and Bean, 1885, Proc. U. S. Nat. Mus., 8: 599—Gulf of Mexico, 1324 meters.

Bathygadus longifilis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 157; Goode and Bean, 1895, Ocean. Ichth., p. 422; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 90; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2566; Murray and Hjort, 1912, Depths of Ocean, p. 399, fig. 273; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 88; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 116.

Hymenocephalus longifilis Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 218, pl. 23, fig. 1.

Gadomus longifilis Regan, 1903, Ann. Mag. Nat. Hist., (7), 11: 459; Gilbert and Hubbs, 1920, Bull. U. S. Nat. Mus., 100, (1), p. 391; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 452, fig. 221; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), p. 10, fig. 3.

Deep-abyssal record.—Eastern Atlantic off Morocco, ca. 31° N., 10° W., 2165 meters, one specimen.

Distribution.—Western Atlantic, only in the Gulf of Mexico, at least seventeen specimens¹ taken between 631–914 and 1351

¹ Including twelve hitherto unrecorded examples taken by the United States Fish and Wildlife Service Research Vessel *Oregon* at Station 349, 29° 09' N., 87° 58' W., 470–500 fathoms, May 22, 1951, seven specimens; and Station 640, 29° 01' N., 88° 24' W., 355–475 fathoms, Sept. 19, 1952, five specimens.

meters. Eastern Atlantic off the Azores, Portugal, Morocco, the Canaries and Soudan, one deep-abyssal specimen and seventy-six in 1084-1635 meters.

Length.—70-292 mm.

Remarks.—Indo-Pacific specimens identified with this species were referred to other forms by Gilbert and Hubbs (1920, p. 391), who also stated that the eastern Atlantic records were not actually *longifilis*. Parr (1946, p. 10) accepted the species as cosmopolitan. Whatever the geographical range may be it is extremely doubtful that the species is more than accidental in the deep-abyssal zone.

Nematonurus cyclolepis Gilbert

Nematonurus cyclolepis Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 458—Pacific off the Queen Charlotte Islands.

Moseleya cyclolepis Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2570.

Dolloa cyclolepis Jordan, Evermann and Clark, 1930, Rep. U. S. Comm. Fish., 1928, (2), p. 203; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 134, fig. 76.

Nematonurus cyclolepis Böhlke, 1953, Stanf. Ichth. Bull., 5: 59.

Deep-abyssal record and distribution.—Eastern Pacific, 2904 meters, two specimens.

Length.—?-150 mm.

Nematonurus lecointei Dollo

Macrurus Lecointei Dollo, 1900, Bull. Acad. roy. Belg., (3), 38: 384—Antarctic, ca. 70° S., 102° W., 2800 meters.

Nematonurus lecointei Dollo, 1904, Res. Voy. Belgica, Zool., Poiss., p. 44, pl. 7; 1909, Proc. Roy. Soc. Edinburgh, 29: 488; Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 235; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal records and distribution.—Antarctic, ca. 62° S., 41° W., 3246 meters, one specimen.

Antarctic, ca. 70° S., 102° W., 2800 meters, one specimen.

South Atlantic, ca. 48° S., 10° W., 3185 meters, one specimen.

Length.—?-428 mm.

Nematonurus suborbitalis Gill and Townsend

Macrurus (Nematonurus) suborbitalis Gill and Townsend, 1897, Proc. Biol. Soc. Washington, 11: 234—Bering Sea, ca. 55° N., 170° W.

Nematonurus suborbitalis Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2572; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal record and distribution.—Bering Sea, 3239 meters, one specimen.

Length.—508 mm.

Nematonurus lepturus Gill and Townsend

Macrourus lepturus Gill and Townsend, 1897, Proc. Biol. Soc. Washington, 11: 233—Bering Sea, ca. 54° N., 168° W., 2562 meters.

Macrourus dorsalis Gill and Townsend, 1897, op. cit., p. 233.

Macrourus lepturus Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2584; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 487; Gilbert and Burke, 1912, Bull. U. S. Bur. Fish., 30: 91.

Nematonurus lepturus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 162.

Deep-abyssal records and distribution.—Bering Sea, ca. 54° N., 168° W., 2562 meters, two specimens.

Bering Sea, ca. 53° N., 171° W., 2226, 2065 meters, two specimens.

Length.—375–660 mm.

Nematonurus abyssorum Gilbert

Nematonurus abyssorum Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 374, pl. 21—Pacific off Santa Catalina Island.

Nematonurus abyssorum Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal record and distribution.—Eastern Pacific, 2469–3991 meters, one specimen.

Length.—803 mm.

Nematonurus armatus Hector. Table 16.

Macrurus armatus Hector, 1875, Ann. Mag. Nat. Hist., (4), 15: 81; 1875, Trans. New Zealand Inst., 7: 249, pl. 11—off Cape Farewell, New Zealand, 732 meters.

Coryphaenoides affinis Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 27.

Coryphaenoides variabilis Günther, 1878, op. cit., p. 27.

Macrurus asper Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 196.

Macrurus goodii (*goodei* of authors) Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 136; Schnakenbeck, 1932, Faune Ichth. Atl. Nord, 12, fig.; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 182.

Macrurus armatus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 150, pl. 40, fig. A; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 455, fig. 222.

Macrurus affinis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 151, pl. 40, fig. B.

Coryphaenoides gigas Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 232, pl. 20, fig. 2.

Hymenocephalus goodei Goode and Bean, 1895, Ocean. Ichth., p. 407, fig. 340.

Nematonurus armatus Goode and Bean, 1895, Ocean. Ichth., p. 416; Regan, 1914, Brit. Antarctic (Terra Nova) Exp. 1910, Zool., 1: 39; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143; Waite, 1916, Sci. Rep. Austr. Antarctic Exp. 1911-1914, (C), 3: 76; 1921, Rec. So. Austr. Mus., 2, (1), p. 65, fig. 99; McCulloch, 1929-30, Mem. Austr. Mus., 5: 127; Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42, (9), p. 322; Schroeder, 1940, Copeia, p. 233; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 9, 54, figs. 1, 17; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947-48, Zool., 2, (1), pp. 13, 24.

Nematonurus affinis Goode and Bean, 1895, Ocean. Ichth., p. 416; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143; Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42, (9), p. 322.

Nematonurus gigas Goode and Bean, 1895, Ocean. Ichth., p. 416 (not fig. 346); Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143; Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 21; 1919, Rés. Camp. Sci. Monaco, 52: 87, pl. 3, fig. 1; Vaillant, in Roule, 1919, op. cit., p. 134; Farran, 1924, Proc. Roy. Irish Acad., B36: 118.

Macrurus (Hymenocephalus) goodei Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 26.

Nematonurus goodei Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2571; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Macrurus (Nematonurus) goodei Ehrenbaum, 1902, Fauna Arct., 2: 117.

Macrurus (Nematonurus) armatus Murray and Hjort, 1912, Depths of Ocean, p. 398, fig. 272; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 109, fig. 38.

Distribution.—Eastern Atlantic in Denmark Strait and ca. 49°–27° N., 5°–33° W. Mid-Atlantic on the mid-Atlantic ridge (ca. 45° N., 25° W.) and west of it (ca. 40° N., 35° W.). Western Atlantic in Davis Strait, 39°–41° N., and off Havana. South Atlantic off Montevideo. Pacific in ca. 36° N., 178° E.; ca. 0° 33' S., 151° W.; off New Zealand; and off Kangaroo Island, South Australia. South Indian Ocean in ca. 46° S., 45° and 48° E.; and 50° S., 108° and 123° E.

N. armatus is one of the few fishes known from more than one or two hauls made on the abyssal plain, below 3660 meters, where twelve specimens have been taken. Its center of distribution may be higher. At least forty-six of the more than seventy-six specimens recorded were caught between about 2600 and 3660 meters. The number of specimens per haul is unknown in many of the western Atlantic records, most of which were in depths of 2200–2600 meters. The species could be more common below 3660 meters than avail-

able information indicates, as relatively few hauls have been made on the abyssal plain.

There are only three records from above the deep-abyssal zone: in the western Atlantic off Havana in 282 meters (number of specimens not reported) and in ca. 40° N., 68° W. in 556 meters (one specimen); and off New Zealand in 732 meters (one specimen). The species is probably accidental at such depths. Extreme depth range 282–4700 meters.

Length.—127–805 mm.

Coryphaenoides rupestris Gunnerus

Coryphaenoides rupestris Gunnerus, *1765, Trondhjem Selsk. Skr., 3: 50, pl. 3, figs. 1, 2—Atlantic off Norway.

Coryphaenoides rupestris Collins, Bean and Rathbun, 1887, Bull. U. S. Fish. Comm., 7: 243; Collett, 1903, Vidensk. Selsk. Forh., 1903, (9), p. 71; 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 52; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; Johnsen, 1921, Bergens Mus. Aarb. 1918–19, (6), p. 48, pl., figs. 3, 4; Hickling, 1928, Ann. Mag. Nat. Hist., (10), 2: 196; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 50, 74, figs. 23, 24 (full synonymy); Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 177; Rae and Wilson, 1953, Scottish Nat., 65: 144; Scholander and Van Dam, 1953, Biol. Bull., 104: 76; 1954, op. cit., 107: 249.

Macrurus rupestris Smitt, 1895, Skand. Fiskar, p. 590, pl. 27A, fig. 2; Schnakenbeck, 1931, Faune Ichth. Atl. Nord, 7, 3 figs.; Ehrenbaum, *1936, Naturg. wirtsch. Bedeut. Seefische Nordeur., p. 130, fig. 102; Saemundsson, 1949, Zool. Iceland, 4, (72), p. 74 (further refs., Iceland).

Macrurus (Coryphaenoides) rupestris Knipowitsch, 1926, Trans. Inst. Sci. Expl. North, 27: 149, fig. 114; Rae and Wilson, 1952, Cons. Perm. Int. Expl. Mer, Ann. Biol., 9: 39; Andriashev, 1954, Fauna S.S.S.R., 53: 195, 534, fig. 96.

Macrurid larva "A. H." 1 a and "A. H." 2 Johnsen, 1927, Nyt. Mag. Naturv., B65: 222, 224, pl. 7, figs. 1, 3.

Deep-abyssal record.—Northeastern Atlantic, ca. 61° N., 17° W., 2276 meters, one specimen.

Distribution.—North Atlantic, from Davis Strait (ca. 66° N.) to ca. 37° N. in the west and from ca. 64° N. to the Gulf of Gascony in the east. Once found floating at the surface, depth range otherwise 155–1669 meters, with one deep-abyssal record. Rare above 500 meters, frequent in 500–1200 meters, accidental in deep-abyssal waters.

Length.—35–1000 mm.

Remarks.—There is evidence that the species may occasionally rise into intermediate waters.

Chalinura murrayi Günther

Coryphaenoides murrayi Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 26
—Pacific off New Zealand, ca. 40° S., 177° E., 2012 meters.

Macrurus murrayi Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 146, pl. 34, fig. A.

Chalinura murrayi Goode and Bean, 1895, Ocean. Ichth., p. 412.

Macrurus (Coryphaenoides) mediterraneus Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; 1910, op. cit., 1908, 5: 5.

Macrurus (Chalinura) murrayi Murray and Hjort, 1912, Depths of Ocean, p. 398; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 103.

Coryphaenoides murrayi Farran, 1924, Proc. Roy. Irish Acad., B36: 102, pl. 7, fig. 3, text fig. 3; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 456.

Chalinura murrayi europaea Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 61, pl. 4, figs. 1, 2, text fig. 6.

Deep-abyssal records.—Eastern Atlantic, ca. 35° N., 8° W., 2150–3000 meters, fifteen specimens.

Eastern Atlantic, ca. 35° N., 8° W., 2055 meters, one specimen.

Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, two specimens.

Southwestern Pacific off New Zealand, 2012 meters, five specimens, including the type.

Distribution.—Eastern Atlantic, three deep-abyssal records and, off southwestern Ireland, ten specimens from four hauls in 1207–1797 meters. Southwestern Pacific, one deep-abyssal record.

Length.—77–500+ mm.

Remarks.—The species is close to *C. mediterranea* and the two eastern Atlantic specimens referred to that species by Roule (1919, p. 87) may prove to be *murrayi*. Roule's specimens were taken near the Azores in 1940 and 1886 meters.

Chalinura mediterranea Giglioli

Chalinura mediterranea Giglioli, 1893, Zool. Anz., 16: 342—Mediterranean off Sardinia.

Coryphaenoides serratus Giglioli, *1881, Atti 3 Congr. Geogr. Intern., 1: 366; 1882, Nature, London, 25: 505; *1882, Ann. Sci. Nat. Zool., 13, (9); *1883, Atti 3 Congr. Geogr. Intern., 2: 195; Giglioli and Issel, *1884, Pelagos, p. 227; Carus, 1893, Prodr. Faunae Medit., 2: 583.

Chalinura mediterranea Goode and Bean, 1895, Ocean. Ichth., p. 533, fig. 345, a.

Coryphaenoides mediterraneus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal records and distribution.—Mediterranean off Sardinia, ca. 41° N., 6°–7° E., 2904, 2805 meters, two specimens.

Length.—215, 235 mm.

Remarks.—The two specimens reported by Roule (1919, p. 87) from the eastern Atlantic should be re-examined. Other reports outside the Mediterranean have proved erroneous (Farran, 1924, p. 102; Nybelin, 1948, p. 61). See remarks under *C. murrayi*, above. Fowler (1936, p. 466) has placed Roule's specimens in the synonymy of *Trachonurus asperrimus* Vaillant, without explanation or further description.

Chalinura fernandeziana Günther

Macrurus fernandezianus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 145, pl. 37, fig. B—Pacific south of Juan Fernandez, ca. 33° S., 78° W.

Chalinura fernandezianus Goode and Bean, 1895, Ocean. Ichth., p. 412.

Coryphaenoides fernandezianus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal record and distribution.—Southeastern Pacific, 2515 meters, one specimen.

Length.—279 mm.

Chalinura filifera Gilbert

Chalinura filifera Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 458—Pacific off the Queen Charlotte Islands.

Chalinura filifera Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2577; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 135, fig. 77.

Coryphaenoides filifer Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal record and distribution.—Eastern Pacific, 2904 meters, three specimens.

Length.—520–550 mm.

Chalinura liocephala Günther

Macrurus liocephalus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 145, pl. 38, fig. A—Pacific off Japan, ca. 34° N., 140° E., 3429 meters.

Chalinura liocephala Goode and Bean, 1895, Ocean. Ichth., p. 412; Jordan and Gilbert, in Jordan and Starks, 1904, Bull. U. S. Fish Comm., 22: 608.

Coryphaenoides liocephalus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal records and distribution.—Mid-Pacific, ca. 36° N., 178° E., 3749 meters, two specimens.

Western Pacific off Japan, 3429 meters, one specimen.
Length.—190.5–419 mm.

Chalinura simula Goode and Bean

Chalinura simula Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 199
 —Atlantic, ca. 41° N., 65° W., 2271 meters.

Macrurus simulus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 145.

Chalinura simula Goode and Bean, 1895, Ocean. Ichth., p. 412, fig. 345;
 Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2578; 1900, op. cit.,
 fig. 910; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 86; Schroeder, 1940,
 Copeia, p. 234; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 31,
 65, figs. 9, 20; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947–1948,
 Zool., 2, (1), p. 24.

Macrurus (Chalinura) simulus Lütken, 1898, Danish Ingolf Exp., 2, (1),
 p. 28; Ehrenbaum, 1902, Fauna Arct., 2: 117; Murray and Hjort, 1912,
 Depths of Ocean, p. 398; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl.
 Deep-sea Exp. 1910, 4, (1), p. 100.

Coryphaenoides simulus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51:
 143; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 457.

Deep-abyssal records.—Mid-Atlantic west of the mid-Atlantic
 ridge, ca. 40° N., 35° W., 4590–4600 meters, one specimen.

Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W.,
 3120 meters, two specimens.

Western Atlantic, ca. 39° N., 66° W., 3704 meters, one specimen.

Western Atlantic, ca. 38° N., 69° W., 3166 meters, (?) specimens.

Western Atlantic, 37°–41° N., 73°–65° W., 2552, 2455, 2271
 meters, an unstated number of specimens from three hauls.

Denmark Strait, ca. 64° N., 31° W., 2261 meters, two specimens.

Denmark Strait, ca. 61° N., 30° W., 2075 meters, four specimens.

Eastern Atlantic, ca. 34° N., 33° W., 2615–2865 meters, five
 specimens in one haul.

Eastern Atlantic, 37°–38° N., 26°–28° W., 2102, 1919 meters,
 two specimens.

Distribution.—North Atlantic from Denmark Strait (ca. 65° N.)
 to ca. 34° N. in the east, ca. 40° N. centrally and ca. 31° N. in the
 west, twelve deep-abyssal records, two specimens in 1669 meters
 and three juvenile specimens, about 25 mm. long, doubtfully re-
 ferred to this species, in 610 and 1183 meters. A deep-abyssal
 species with two specimens known from the abyssal plain.

Length.—25(?) and 160–620 mm.

Chalinura carapina Goode and Bean. Table 17.

Coryphaenoides carapinus Goode and Bean, 1883, Bull. Mus. Comp. Zool., **10**: 197—Atlantic off United States coast, figured specimen from Blake Station 342, 39° 43' N., 70° 55' 25" W., 1833 meters.

Coryphaenoides carapinus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., **22**: 138; Goode and Bean, 1895, Ocean. Ichth., p. 404, fig. 339; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., **47**: 2579; 1900, op. cit., fig. 911; Roule and Angel, 1933, Rés. Camp. Sci. Monaco, **86**: 62, pl. 3, fig. 29; Gregory, 1933, Trans. Amer. Phil. Soc., **23**, (2), p. 383, fig. 262; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 1246, fig. 535; Schroeder, 1940, Copeia, p. 235.

Macrurus carapinus Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (1), pp. 106, 108.

Chalinura carapina Parr, 1946, Bull. Bingham Oceanogr. Coll., **10**, (1), pp. 31, 68, figs. 9, 21; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947-1948, Zool., **2**, (1), pp. 14, 16.

Distribution.—Eastern Atlantic, eight specimens from deep-abyssal waters (ca. 34° N., 33° W.; ca. 27° N., 14° W.; and ca. 22° N., 23° W.) and one specimen off the Azores in 1740 meters. Mid-Atlantic on the mid-Atlantic ridge (ca. 45° N., 25° W.) and east of it (ca. 1° N., 18° W.), two deep-abyssal records. Western Atlantic, 35°–42° N., twenty-five deep-abyssal records and ten hauls in 1211–1748 meters. Depth range 1211–5300 meters. Chiefly deep-abyssal, with two specimens known from the abyssal plain.

Length.—120–340 mm.

Chalinura ferrieri Regan

Chalinura ferrieri Regan, 1913, Trans. Roy. Soc. Edinburgh, **49**: 236, pl. 2, fig. 1—Antarctic, ca. 71° S., 16° W., 2579 meters.

Chalinura ferrieri Waite, 1916, Sci. Rep. Austr. Antarctic Exp. 1911-1914, (C), **3**, (1), p. 13, fig. 1.

Coryphaenoides ferrieri Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., **51**: 143.

Deep-abyssal records and distribution.—Antarctic, ca. 64° S., 127° E., 3109 meters, one specimen.

Antarctic off Coats Land, 2579 meters, one specimen.

Length.—230–250 mm.

Chalinura whitsoni Regan

Chalinura whitsoni Regan, 1913, Trans. Roy. Soc. Edinburgh, **49**: 236, pl. 2, fig. 2—Antarctic, ca. 71° S., 16° W., 2579 meters.

Chalinura whitsoni Waite, 1916, Sci. Rep. Austr. Antarctic Exp. 1911-1914, (C), **3**, (1), p. 14.

Coryphaenoides whitsoni Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143; Norman, 1937, Rep. B.A.N.Z. Antarctic Res. Exp. 1929-1931, (B), 1, (2), p. 68.

Deep-abyssal records.—South Atlantic, ca. 48° S., 10° W., 3185 meters, one specimen.

Antarctic off Coats Land, 2579 meters, one specimen.

Distribution.—Antarctic and South Atlantic, five specimens known, two of them deep-abyssal, two in 1590 meters (ca. 63° S., 101° E.) and one in 604 meters (ca. 60° S., 58° E.).

Length.—270-525 mm. (572 mm. fresh).

Chalinura guentheri Vaillant. Table 18.

Macrurus Guentheri Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 386—Atlantic off Morocco, 2200 or 2115 meters (type locality not stated; see footnote, p. 110).

Macrurus sclerorhynchus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool, 22: 133, pl. 32, fig. A; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 265.

Macrurus sclerorhynchus var. Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 54.

Macrurus holotrachys Vaillant, 1888, op. cit., p. 241, pl. 22, fig. 3.

Macrurus guntheri Collett, 1896, Rés. Camp. Sci. Monaco, 10: 80, pl. 3, fig. 10; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; Murray and Hjort, 1912, Depths of Ocean, p. 397; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 79; Vaillant, in Roule, 1919, op. cit., p. 134; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 87, figs. 23, 24.

Coryphaenoides (Macrurus) guntheri Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 56.

Coryphaenoides guentheri Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Lionurus Guntheri Farran, 1924, Proc. Roy. Irish Acad., B36: 116, fig. 7.

Macuroplus guentheri Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 463.

Chalinura guntheri Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 65, fig. 6.

Deep-abyssal records.—Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, one specimen.

Eastern Atlantic southeast of Portugal and off the coast of Morocco, 1994-2300 meters, thirteen specimens from five hauls.

Eastern Atlantic from the Azores to ca. 57° N., 11° W., 1846-1940 meters, seventy-three specimens from five hauls.

(?) Indian Ocean, Gulf of Aden, 1840 meters, one specimen.

Distribution.—Eastern Atlantic from the Faroe-Shetland Channel to off the Canary Islands, eleven deep-abyssal records and thirty-four specimens from five hauls in 1200–1797 meters. (?) North Indian Ocean, one deep-abyssal record. Probably not rare in the upper part of the deep-abyssal zone. Center of distribution perhaps in 1800–2000 meters.

Length.—136–480 mm.

Remarks.—The Indian Ocean record is based on a specimen originally identified as *M. sclerorhynchus* (Brauer, 1906, p. 265) and referred to *guentheri* by Koefoed (1927, p. 87). Nybelin (1948, p. 65) doubted that Koefoed's conclusion was correct.

Chalinura serrula Bean

Chalinura serrula Bean, 1890, Proc. U. S. Nat. Mus., 13: 37—Pacific off Prince of Wales Island, ca. 55° N., 136° W.

Chalinura serrula Goode and Bean, 1895, Ocean. Ichth., p. 412; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2576.

Coryphaenoides serrulus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record and distribution.—Northeastern Pacific, 2869 meters, three specimens.

Length.—?–318 mm.

Chalinura brevibarbis Goode and Bean

Chalinura brevibarbis Goode and Bean, 1895, Ocean. Ichth., p. 413—Atlantic, ca. 41° N., 66° W., 2295 meters.

Macrurus (Chalinura) brevibarbis Murray and Hjort, 1912, Depths of Ocean, p. 398; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 105, pl. 5, fig. 10, text figs. 36, 37.

Coryphaenoides brevibarbus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Chalinura brevibarbis Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 31, 71, figs. 9, 22.

Deep-abyssal records.—Eastern Atlantic, ca. 45° N., 9° W., 4700 meters, one specimen.

Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, one specimen.

Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W., 3120 meters, three specimens.

Western Atlantic, 38°–41° N., 66°–70° W., 3166, 2491, 2295 meters, an unstated number of specimens from three hauls.

Distribution.—Eastern and mid-Atlantic, three deep-abyssal records. Western Atlantic, 38°–41° N., 66°–71° W., an unstated

number of specimens from three deep-abyssal hauls and two in 1813 and 1748 meters. Probably chiefly deep-abyssal.

Length.—240–345 mm.

Macrourus paradoxus Smith and Radcliffe

Macrourus paradoxus Smith and Radcliffe, in Radcliffe, 1912, Proc. U. S. Nat. Mus., 43: 115, pl. 25, fig. 1—Pacific off Palawan, Philippine Islands.

Coryphaenoides paradoxus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal record and distribution.—Western Pacific, 2021 meters, one specimen.

Length.—585 mm.

Macrourus bucephalus Garman

Macrurus bucephalus Garman, 1899, Mem. Mus. Comp. Zool., 24: 195, pl. 44, fig. 2—Pacific off Mexico, Panama, and Ecuador (type locality not designated).

Coryphaenoides bucephalus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 143.

Deep-abyssal records.—Eastern Pacific, ca. 1° N., 80° W., 2877 meters, (?) specimens.

Eastern Pacific, ca. 7° N., 79° W., 1865 meters, (?) specimens.

Distribution.—Eastern Pacific, ca. 1°–7° N., 79°–86° W. and ca. 23° N., 107° W., two deep-abyssal records and an unstated number of specimens from two hauls in 1599 and 245 meters.

Length.—Not known.

Remarks.—Since Garman did not include lengths in his type description it is not possible to determine the age of the specimen taken in 245 meters.

Macrourus carminifer Garman

Macrurus carminifer Garman, 1899, Mem. Mus. Comp. Zool., 24: 204, pl. 46, fig. 2—Pacific off Panama, ca. 7° N., 78°–80° W., (type locality not designated).

Coryphaenoides carminatus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record.—Eastern Pacific, ca. 7° N., 79° W., 1865 meters, (?) specimens.

Distribution.—Eastern Pacific, ca. 7° N., 78°–80° W., an unstated number of specimens from four hauls, one deep-abyssal, the others in 1335, 1271 and 588 meters.

Length.—?–305 mm.

Macrourus anguliceps Garman

Macrurus anguliceps Garman, 1899, Mem. Mus. Comp. Zool., 24: 212, 363, pl. G, fig. 1, pls. 50, 83, fig. 2—Pacific off northern South America, off Panama, and in the Gulf of California (type locality not designated).

Coryphaenoides anguliceps Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal records.—Eastern Pacific from ca. 0° 36' S., 86° W. to ca. 7° N., 79° W., 2417, 2322, 2150, 2070, 1951 meters, an unstated number of specimens from five stations.

Distribution.—Eastern Pacific off northern South America and Panama, and in the Gulf of California, ca. 26° N., 110° W., five deep-abyssal records and three hauls in 1271–1570 meters.

Length.—?–343 mm.

Macrourus longicirrhus Gilbert

Macrurus longicirrhus Gilbert, 1905, Bull. U. S. Fish Comm., 23: 672, fig. 263—Pacific off Hawaii.

Coryphaenoides longicirrhus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144; Fowler, 1938, Monogr. Acad. Nat. Sci. Philadelphia, 2: 217.

Deep-abyssal record.—Hawaiian Islands, 1829–2403 meters, one specimen.

Distribution.—Hawaiian Islands, one deep-abyssal record and one specimen from an unknown depth.

Length.—590–965 mm.

Macrourus aequatoris Smith and Radcliffe

Macrurus aequatoris Smith and Radcliffe, in Radcliffe, 1912, Proc. U. S. Nat. Mus., 43: 120, pl. 26, fig. 3—Gulf of Tomini, Celebes, 1992 meters.

Coryphaenoides aequatoris Gilbert and Hubbs, 1920, Bull. U. S. Nat. Mus., 100, (1), p. 419; Weber and de Beaufort, 1929, Fishes Indo-Austr. Arch., 5: 30.

Deep-abyssal records and distribution.—Western Pacific, Gulf of Tomini, 1997, 1992 meters, two specimens.

Length.—166 +–188 mm.

Macrourus cinereus Gilbert

Macrurus cinereus Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 457—Bering Sea, ca. 55° N., 155° W., 1271 meters.

Macrurus cinereus Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2586; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 487; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 350; Gilbert and Burke, 1912, op. cit., 30: 92; Soldatov and Lindberg, 1930, Bull. Pac. Sci. Inst. Fish. Oceanogr., 5: 521; Böhlke, 1953, Stanf. Ichth. Bull., 5: 58.

Coryphaenoides cinereus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 167; 1920, Bull. U. S. Nat. Mus., 100, (1), p. 371; Schmidt, 1950, Akad. Sci. U.S.S.R., Trans. Pac. Comm., 6: 61.

Deep-abyssal record.—Bering Sea, ca. 53° N., 170° W., 1890 meters, (?) specimens.

Distribution.—North Pacific in the Okhotsk and Bering seas, abundant between 630 and 1400 meters, also known from one deep-abyssal record and from one specimen each in 1687 and 1643 meters. Although its lower limit is below 1829 meters the species is certainly not to be considered deep-abyssal.

Length.—190.5–444.5 mm.

Macrourus altipinnis Günther

Coryphaenoides altipinnis Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 439—Pacific off Japan, ca. 34° N., 140° E., 3429 meters.

Macrurus altipinnis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 138, pl. 39, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 402; Jordan and Gilbert, in Jordan and Starks, 1904, Bull. U. S. Fish Comm., 22: 608.

Coryphaenoides altipinnis Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record.—Western Pacific off Japan, 3429 meters, the type.

Distribution.—Western Pacific off Japan, one deep-abyssal record and two specimens in 1034 meters (ca. 34° N., 138° E.).

Length.—152–483 mm.

Macrourus ingolfi Lütken

Macrurus ingolfi Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 27—Atlantic south of Iceland, ca. 62° N., 21° W., 1545 meters.

Macrurus ingolfi Ehrenbaum, 1902, Fauna Arct., 2: 117.

Coryphaenoides ingolfi Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal records.—North Atlantic in Denmark Strait, ca. 64° N., 31° W., 2378 meters, one specimen.

North Atlantic, ca. 61° N., 30° W., 2075 meters, one specimen.

North Atlantic, ca. 62° N., 19° W., 1904 meters, one specimen.

Distribution.—North Atlantic, 61°–64° N., 19°–31° W., three deep-abyssal specimens, one in 1669 meters and two in 1545 meters.

Length.—270–340 mm.

Macrourus sublaevis Vaillant

Coryphaenoides sublaevis Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 386
—Talisman Station 111, Cape Verde Islands, 580 meters (see footnote, p. 110).

Coryphaenoides aequalis Vaillant, 1888, op. cit., p. 225 (part), pl. 19, fig. 2.

Malacocephalus sublaevis Goode and Bean, 1895, Ocean. Ichth., p. 535.

Coryphaenoides sublaevis Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Distribution.—Eastern Atlantic.

Remarks.—There is some confusion attending Vaillant's records of this species. He described as *Coryphaenoides aequalis* fifty-two specimens taken by the *Talisman* off Morocco, Soudan, the Cape Verde Islands and on Arguin Banc, in 140–2200 meters. In the appendix of the same volume the author stated that the specimens represented a new species, *Coryphaenoides sublaevis*, except for certain individuals with different dentition. These, according to Vaillant, were actually *Malacocephalus laevis* Lowe. Professor Bertin has written (1950, in litt.) that the Museum of Natural History in Paris now has only eight of the original fifty-two specimens, including the type of *C. sublaevis*, from Station 111, Cape Verde Islands, 580 meters (the specimen for which measurements were given by Vaillant on page 227). Bertin also wrote that Vaillant did not mark the specimens he had separated as *M. laevis*. The latter species has been reported only from shallower strata and the deeper records listed by Vaillant perhaps refer to *sublaevis*. There are three of these, one specimen in 2200 meters, one in 2115 meters, and one in 2104 meters.

Length.—Type 430 mm.

Macrourus hextii Alcock

Macrurus Hextii Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 299—Arabian Sea, ca. 11° N., 74° E., 1829 meters.

Macrurus hextii Alcock, 1891, Ann. Mag. Nat. Hist., (6), 7: 11; 1892, op. cit., (6), 10: 351; 1894, Jour. Asiat. Soc. Bengal, 63: 126; 1894, Ill. Zool. Investigator, Fishes, pl. 12, fig. 3; Goode and Bean, 1895, Ocean. Ichth., p. 390.

Macrurus (Macrurus) hextii Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 113.

Coryphaenoides hextii Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record.—Arabian Sea, 1829 meters, the type.

Distribution.—Arabian Sea, one deep-abyssal specimen and one in ca. 12° N., 71° E., 1582–1609 meters.

Length.—?—ca. 584 mm.

Macrourus wood-masoni Alcock

Macrurus Wood-Masoni Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 301
—Arabian Sea, ca. 11° N., 74° E., 1829 meters.

Macrurus wood-masoni Alcock, 1891, op. cit., (6), 7: 11; 1891, op. cit., (6), 8: 121; 1892, op. cit., (6), 10: 353; 1894, Ill. Zool. Investigator, Fishes, pl. 13, fig. 1; 1894, Jour. Asiat. Soc. Bengal, 63: 126; Goode and Bean, 1895, Ocean. Ichth., p. 390.

Macrurus (Macrurus) wood-masoni Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 114; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 26.

Coryphaenoides wood-Masoni Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal records.—Gulf of Aden, 1840 meters, one specimen.
Arabian Sea, 1829 meters, the type.

Distribution.—North Indian Ocean off northeast Africa (ca. 1° S., 41° E.), in the Gulf of Aden, and in the Arabian Sea (6°–15° N., 72°–78° E.), two deep-abyssal specimens and an unknown number in 693, 1022, 1350 and 1650 meters.

Length.—340–495 mm.

Macrourus hoskyni Alcock

Macrurus Hoskynii Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 214—Bay of Bengal, ca. 18° N., 85° E.

Macrurus hoskynii Alcock, 1891, op. cit., (6), 7: 11; 1894, Ill. Zool. Investigator, Fishes, pl. 9, fig. 4; 1894, Jour. Asiat. Soc. Bengal, 63: 126; Goode and Bean, 1895, Ocean. Ichth., p. 390.

Macrurus (Macrurus) hoskynii Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 116.

Coryphaenoides hoskynii Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record and distribution.—Bay of Bengal, 2395 meters, one specimen.

Length.—362 mm.

Macrourus camurus Smith and Radcliffe

Macrourus camurus Smith and Radcliffe, in Radcliffe, 1912, Proc. U. S. Nat. Mus., 43: 122, pl. 27, fig. 2—Pacific off Palawan, Philippine Islands.

Coryphaenoides camurus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144; 1920, Bull. U. S. Nat. Mus., 100, (1), p. 421.

Deep-abyssal record and distribution.—Western Pacific, 2021 meters, one specimen.

Length.—102 mm.

Macrourus orthogrammus Smith and Radcliffe

Macrourus orthogrammus Smith and Radcliffe, in Radcliffe, 1912, Proc. U. S. Nat. Mus., 43: 123, pl. 27, fig. 3—Pacific near Gomo Island, Dutch East Indies.

Coryphaenoides orthogrammus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144; 1920, Bull. U. S. Nat. Mus., 100, (1), p. 421; Weber and de Beaufort, 1929, Fishes Indo-Austr. Arch., 5: 32.

Deep-abyssal record and distribution.—Western Pacific, 2308 meters, one specimen.

Length.—180 mm.

Macrourus asper Günther

Coryphaenoides asper Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 440—Pacific south of Japan, ca. 34° N., 140° E.

Macrurus asper Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 137, pl. 36, fig. A.

Coryphaenoides asper Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 144.

Deep-abyssal record and distribution.—Western Pacific, 3429 meters, one specimen.

Length.—330 mm.

Macrourus albatrossus Townsend and Nichols

Macrourus albatrossus Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 17, pl. 4—Pacific off Lower California, ca. 31° N., 118° W.

Deep-abyssal record and distribution.—Eastern Pacific, 1968 meters, one specimen.

Length.—Not stated.

Hemimacrus acrolepis Bean

Macrurus acrolepis Bean, 1884, Proc. U. S. Nat. Mus., 6: 362—Pacific off Washington, from the stomach of a seal.

Macrurus acrolepis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 124; Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 457; 1899, op. cit., 1898: 28; 1915, Proc. U. S. Nat. Mus., 48: 376; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2585; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 487, pl. 82; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 350, fig. 131; Gilbert and Burke, 1912, op. cit., 30: 91; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 162; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 16, pl. 4; Johnsen, 1927, Nyt Mag. Naturv., B65: 241; Taranetz, 1937, Bull. Pac. Sci. Inst. Fish. Oceanogr., 11: 170; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 136, fig. 78.

Coryphaenoides bona-nox Jordan and Thompson, 1914, Mem. Carnegie Mus., 6, (4), p. 305, pl. 38.

Nemalonurus bona-nox Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 162.

Hemimacrus acrolepis Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42: 322.

Deep-abyssal records.—Bering Sea, ca. 53° N., 171° W., 2226 meters, (?) specimens.

Eastern Pacific off the American coast from ca. 29° N. to the vicinity of San Diego, 2182, 1994, 1968, 1937 meters, an unstated number of specimens from four hauls.

Eastern Pacific near San Diego, 2469–1235 meters, (?) specimens, perhaps caught in deep-abyssal waters.

Distribution.—Pacific from ca. 54° N., 176° E. in Bering Sea to off southern California, six deep-abyssal records; once taken from the stomach of a seal, once at a depth of 155 meters (two specimens) north of the Aleutian Islands, otherwise in 605–1437 meters, at which depths it is abundant. Western Pacific, Sagami Sea, Japan, three specimens, depth of capture unknown. Perhaps partially deep-abyssal.

Length.—127–780 mm.

Grenurus hirundo Collett

Macrurus hirundo Collett, 1896, Rés. Camp. Sci. Monaco, 10: 72, pl. 2, fig. 8—Atlantic off the Azores, ca. 38° N., 30° W., 1266 meters.

Macrurus hirundo Roule, 1919, Rés. Camp. Sci. Monaco, 52: 80; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 17.

Macruropus hirundo Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 465.

Grenurus hirundo Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 67, pl. 4, fig. 3.

Deep-abyssal records.—Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 meters, one specimen.

Eastern Atlantic, ca. 39° N., 29° W., 1900 meters, five specimens.

Distribution.—Eastern Atlantic only, from off the Azores to the Cape Verde Islands (ca. 39°–15° N.), two deep-abyssal records and ten specimens in 1266–1550 meters.

Length.—100–208 mm.

Grenurus flagellicauda Koefoed

Macrurus flagellicauda Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 99, pl. 5, fig. 8, text figs. 34, 35—Atlantic, ca. 45° N., 25° W., 3120 meters.

Grenurus flagellicauda Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 69, pl. 4, fig. 4.

Deep-abyssal records and distribution.—Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W., 3120 meters, four specimens.

Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 meters, one specimen.

Length.—95+ mm. and ca. 300–400 mm.

Oxygadus labiatus Koehler

Macrurus labiatus Koehler, 1896, Ann. Univ. Lyon, 26: 497, pl. 27, figs. 7, 8—Gulf of Gascony, 570–700 meters.

Macrurus japonicus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 254, 386, pl. 21, fig. 1.

Coryphaenoides (Coelorhynchus) talismani Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 58.

Macrurus labiatus Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 25; Farran, 1924, Proc. Roy. Irish Acad., B36: 109, pl. 7, fig. 6, text fig. 5.

Macrurus (Coelorhynchus) talismani Murray and Hjort, 1912, Depths of Ocean, p. 397; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 78.

Coelorhynchus vaillanti Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 20; 1919, Rés. Camp. Sci. Monaco, 52: 81, pl. 3, fig. 3; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 16.

Coelorhynchus talismani Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 145.

Deep-abyssal record.—Eastern Atlantic off the Azores, 2220 meters, one specimen.

Distribution.—Eastern Atlantic from Faroe Channel to the Cape Verde Islands and west to the Azores, one deep-abyssal record, otherwise in 460–1710 meters. Relatively common down to about 1300 meters, probably accidental in deep-abyssal waters.

Length.—100–460 mm.

Remarks.—Farran (1924, p. 109) reported 132 specimens taken by the *Helga* in 855–1634 meters off southwestern Ireland, but he stated that figures on the average number of specimens per haul indicated that the dredging operations did not reach the lower limits of the species' normal range. This is an interesting species in that it is one of a group that has a cosmopolitan distribution, at no great depth, in tropical and temperate latitudes. The species in this group are closely related and have been sometimes confused with one another. None of the other species has ever been reported from below 1829 meters.

Hymenocephalus italicus Giglioli

Hymenocephalus italicus Giglioli, 1882, Nature, London, 27: 198—Mediterranean off Sicily and Sardinia, 508 and 823 meters.

Malacocephalus laevis Moreau, 1881, Hist. Nat. Poiss. France, 3: 284, fig. 183; Giglioli, 1882, Nature, London, 25: 505; Ariolà, 1904, Ann. Mus. Civ. Stor. Nat. Genova, (3), 1: 161.

Hymenocephalus italicus Giglioli and Issel, *1884, Pelagos, p. 228, fig.; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 31, 211, pl. 19, fig. 1; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 134; Goode and Bean, 1895, Ocean. Ichth., p. 406; Lo Bianco, 1909, Mitt. Zool. Stat. Neapel, 19: 720; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 86; Issel, *1932, Boll. Zool. Napoli, A3, (1), p. 15; Vinciguerra, 1932, Ann. Mus. Civ. Stor. Nat. Genova, 56: 14, pl. 1; Sanzo, 1933, Monogr. Fauna Flora Golfo Napoli, 38: 263, pl. 16, fig. 12; Brunelli and Bini, 1934, Boll. Pesc. Pisc. Idrobiol., 10, (6), p. 9, pl., fig. 9; Nobre, 1935, Fauna Marinha Portugal, 1: 164; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 460, fig. 224; Trotti, 1936, Ann. Mus. Civ. Stor. Nat. Genova, 59: 160, pls. 6-9; 1947, op. cit., 63: 43; Soljan, 1948, Fauna Flora Adriatica, 1: 176, 363, fig.; Tortonese and Trotti, 1949, Atti Accad. Ligure Sci. Lett., 6, (1), p. 60; Karlovac, 1953, Bilj. Inst. Oceanogr. Rib. Split, 4: 1; Poll, 1953, Rés. Sci. Exp. Océanogr. Belge (1948-1949), 4, (2), (3), p. 245, fig. 99.

Macrurus (Mystacourus) italicus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 140.

Macrurus italicus Collett, 1896, Rés. Camp. Sci. Monaco, 10: 85, pl. 2, fig. 7; Zugmayer, 1911, op. cit., 35: 127.

Deep-abyssal records.—Eastern Atlantic, ca. 37° N., 10° W., 4900 meters, one specimen caught in a pelagic net, which it probably entered in shallower water.

Eastern Atlantic off Morocco, 2083, 2075 meters, two specimens.

Distribution.—Mediterranean, abundant in 400-600 meters. Eastern Atlantic from the Azores and Portugal to ca. 11° S., 13° E. (off Angola, West Africa), three deep-abyssal records and many specimens in 410-1590 meters. Common between 500 and 800 meters, rare below 1000 meters. The species may be partially pelagic and thus may not actually have been caught in the deep-abyssal zone.

Length.—60-215+ mm.

Lionurus filicauda Günther

Coryphaenoides filicauda Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 27 —type locality not stated, designated as Challenger Station 299, Pacific between Chile and Juan Fernandez, ca. 33° S., 74° W., 3951 meters, the locality of the specimen figured in Günther, 1887.

Macrurus filicauda Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 141, pl. 34, fig. B.

Macrurus (Lionurus) filicauda Murray and Hjort, 1912, Depths of Ocean, p. 417, fig. 306.

Lionurus filicauda Regan, 1914, Brit. Antarctic (Terra Nova) Exp. 1910, Zool., 1, (1), p. 39; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 146.

Deep-abyssal records and distribution.—South Atlantic, ca. 36° S., 46° W., 4846 meters, three specimens.

South Atlantic, ca. 35° S., 50° W., 3475 meters, one specimen.

Southeastern Pacific, ca. 33° S., 74° W., 3951 meters, one specimen.

South Indian Ocean, ca. 53° S., 108° E., 3566 meters, three specimens.

South Indian Ocean, ca. 50° S., 123° E., 3291 meters, two specimens.

South Indian Ocean, ca. 46° S., 45° E., 2515 meters, twelve specimens.

Known only from twenty-two specimens taken by the *Challenger* in southern seas. Occurring on the abyssal plain and probably confined to deep-abyssal waters.

Length.—102–381 mm.

Lionurus liolepis Gilbert

Macrurus (Lionurus) liolepis Gilbert, 1890, Proc. U. S. Nat. Mus., 13: 117—Pacific off southern California (exact type locality not stated).

Lionurus liolepis Goode and Bean, 1895, Ocean. Ichth., p. 409; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2593; Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 376; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 17.

Macrurus liolepis Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 473; Garman, 1899, Mem. Mus. Comp. Zool., 24: 199.

Deep-abyssal record.—Eastern Pacific off San Nicolas Island, southern California, 1982–2012 meters, (?) specimens.

Distribution.—Eastern Pacific from Cape San Lucas to Monterey Bay, abundant in 294–1655 meters; one deep-abyssal record. Center of distribution above 1000 meters, rarely taken below that depth. Accidental in deep-abyssal waters.

Length.—?–305 mm.

Lionurus fragilis Garman

Macrurus fragilis Garman, 1899, Mem. Mus. Comp. Zool., 24: 203, pl. 46, fig. 1—Pacific off Panama and Ecuador (type locality not designated).

Lionurus fragilis Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 146.

Deep-abyssal records and distribution.—Eastern Pacific, ca. 2° N., 83° W., 3333 meters, (?) specimens.

Eastern Pacific, ca. 6° N., 82° W., 3057 meters, (?) specimens.

Length.—?—229 mm.

Nezumia convergens Garman

Macrurus convergens Garman, 1899, Mem. Mus. Comp. Zool., 24: 210, pl. 48, fig. 1—Pacific off Panama (type locality not designated).

Lionurus (Nezumia) convergens Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 146.

Deep-abyssal record.—Eastern Pacific, ca. 7° N., 79° W., 1865 meters, (?) specimens.

Distribution.—Eastern Pacific, 6°–7° N., 79°–81° W., one deep-abyssal record and an unstated number of specimens from two hauls in 1430 and 1271 meters.

Length.—Not stated.

Nezumia bairdi Goode and Bean

Macrurus Bairdii Goode and Bean, *1877, Amer. Jour. Sci., 14: 471—Atlantic, Massachusetts Bay.

Nezumia bairdii Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 31, 37, figs. 9, 12 (full synonymy); Marshall, 1954, Aspects Deep Sea Biol., pp. 257–259, fig. X-2.

Macrourus bairdii Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 243, fig. 119; Scholander and Van Dam, 1953, Biol. Bull., 104: 76.

Deep-abyssal record.—Western Atlantic, ca. 41° N., 66° W., 2295 meters, (?) specimens.

Distribution.—Eastern Atlantic, one specimen reported near the Azores in 1153 meters, a doubtful identification. Western Atlantic from the West Indies to the Grand Banks of Newfoundland, common and abundant. Vertical range very wide, one deep-abyssal record, otherwise 0–17 meters (three specimens) and 108–1748 meters. Center of distribution well above the deep-abyssal zone, in ca. 400–1000 meters.

Length.—150–400 mm.

Nezumia aequalis Günther

Coryphaenoides aequalis Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 25
—Atlantic south of Portugal, ca. 36° N., 8° W., 1098 meters.

?*Macrurus serratus* Lowe, *1843, Proc. Zool. Soc. London, p. 91; Goode and Bean, 1895, Ocean. Ichth., pp. 392, 534.

?*Coryphaenoides serratus* Günther, 1862, Cat. Fishes Brit. Mus., 4: 396.

Macrurus aequalis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 134, pl. 32, fig. C; Goode and Bean, 1895, Ocean. Ichth., p. 392; Holt and Calderwood, 1895, Sci. Trans. Roy. Dublin Soc., 5, (9), p. 463, pl. 40, fig. 1; Koehler, 1896, Ann. Univ. Lyon, 26: 495; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 75, pl. 2, fig. 9; 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 55; Holt and Byrne, 1906, Rep. Fish. Ireland 1905, Sci. Invest., 2: 24; Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 126; Murray and Hjort, 1912, Depths of Ocean, pp. 59, 397, pl. 8, fig. 2, text figs. 39, a, 270; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 84, pl. 2, fig. 1, text figs. 19-21; Schnakenbeck, 1932, Faune Ichth. Atl. Nord, 12, fig.; Noronha and Sarmento, *1934, Peixes Madeira, p. 112; Lozano Rey, 1934, Bol. Soc. Esp. Hist. Nat., 34: 91; Brunelli and Bini, 1934, Boll. Pesca Pisc. Idrobiol., 10, (6), p. 13; Nobre, 1935, Fauna Marinha Portugal, 1: 507; Jensen, 1948, Skr. Univ. Zool. Mus. København, 9: 181.

Macrurus smiliophorus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 242, pl. 22, fig. 1; Goode and Bean, 1895, Ocean. Ichth., p. 392.

Coryphaenoides aequalis Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 386.

Macrurus serratus Roule, 1919, Rés. Camp. Sci. Monaco, 52: 79; Vaillant, in Roule, 1919, op. cit., p. 134; de Buen, 1935, Not. Res. Inst. Esp. Oceanogr., (2), 88: 72.

Lionurus aequalis Farran, 1924, Proc. Roy. Irish Acad., B36: 113, pl. 7, fig. 5, text fig. 6.

Macruropus serratus Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 464, fig. 225; Cadenat, 1954, Bull. Inst. Fr. Afrique Noire, 16: 568.

Nezumia aequalis Maul, 1951, Bol. Mus. Mun. Funchal, 5: 22, fig. 5.

Lionurus (Nezumia) aequalis Poll, 1953, Rés. Sci. Exp. Océanogr. Belge (1948-1949), 4, (2), (3), p. 240, fig. 97.

Deep-abyssal records.—Eastern Atlantic, ca. 43° N., 9° W., 2320 meters, three specimens.

Eastern Atlantic, ca. 31° N., 10° W., 2165 meters, one specimen.

Distribution.—Eastern Atlantic from Faroe Bank (ca. 61° N.) to the Azores and Angola, West Africa (ca. 11° S.), two deep-abyssal records, others in 200-1805 meters; common, center of distribution in ca. 400-1000 meters. Mediterranean, two records, one in 500 meters. Northwestern Atlantic in Davis Strait, ca. 63° N., one specimen, 860 meters. Accidental in deep-abyssal waters.

Length.—110-360 mm.

Nezumia sclerorhynchus Valenciennes. Table 19.

Lepidoleprus sclerorhynchus, Macrurus sclerorhynchus Valenciennes, in Webb and Berthelot, 1836-44, Ichth. Iles Canaries, p. 80, pl. 14, fig. 1—Canary Islands.

Macrurus sclerorhynchus Günther, 1862, Cat. Fishes Brit. Mus., 4: 394; Vinciguerra, 1879, Ann. Mus. Civ. Stor. Nat. Genova, 14: 622, pl. 2; 1885, op. cit., 22: 459; Giglioli, *1884, Pelagos, pp. 197, 199, 208; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 31, 237, pl. 22, fig. 2; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 134; Steindachner, 1891, Sitz.-Ber. K. Akad. Wiss., 100: 442; Carus, 1893, Prodr. Faunae Medit., 2: 583; Goode and Bean, 1895, Ocean. Ichth., p. 391; Collett, 1896, Rés. Camp. Sci. Monaco, 10: 79; Murray and Hjort, 1912, Depths of Ocean, p. 397; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 79; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 84, figs. 17, 18; Sanzo, 1933, Monogr. Fauna Flora Golfo Napoli, 38: 261, pl. 16, figs. 9-11; Tortonese and Trotti, 1949, Atti Accad. Ligure Sci. Lett., 6, (1), p. 59 (further Mediterranean references).

Lionurus (Nezumia) sclerorhynchus Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 146; Poll, 1953, Rés. Sci. Exp. Océanogr. Belge (1948-1949), 4, (2), (3), p. 243, fig. 98.

Macruropus sclerorhynchus Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 462; Trotti, 1947, Ann. Mus. Civ. Stor. Nat. Genova, 68: 41.

Macrurus (Macrurus) sclerorhynchus Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 65.

Deep-abyssal records.—Eastern Atlantic off Cape Verde, 3655 meters, three specimens.

Eastern Atlantic off Cape Verde, 3200 meters, three specimens.

Eastern Atlantic off Morocco, 2600 meters, one specimen.

Eastern Atlantic off Morocco, the Banc d'Arguin (North Africa) and off the Azores, 2210-2330 meters, twelve specimens from five hauls.

Eastern Atlantic, ca. 35° N., 8° W. and off the Canary Islands, 2055, 2015 meters, two specimens.

Eastern Atlantic off the Azores, ca. 39° N., 29°-30° W., 1900, 1846 meters, two specimens.

Distribution.—Eastern Atlantic from the Azores to ca. 8° S.; numerous specimens in 540-1550 meters and twenty-three from deep-abyssal waters. Mediterranean, 500-600 meters, and one individual found floating at the surface, nearly dead. Relatively common, center of distribution in the Atlantic in ca. 800-1600 meters, with perhaps another, smaller area of abundance in 2200-2300 meters. ?Indian Ocean (see below).

Length.—152-325 mm.

Remarks.—Brauer (1906, p. 265) identified with this species a specimen taken in the Gulf of Aden at a depth of 1840 meters. Koefoed (1927, p. 87) referred Brauer's specimen to *Chalinura guentheri* Vaillant, but Nybelin (1948, p. 65) doubted the wisdom of

this step. The actual range of the species therefore remains in some doubt.

Nezumia parvipes Smith and Radcliffe

Macrurus parvipes Smith and Radcliffe, in Radcliffe, 1912, Proc. U. S. Nat. Mus., 43: 124, pl. 28, fig. 1—Pacific near Gomono Island, Dutch East Indies, 2308 meters.

Lionurus (Nezumia) parvipes Gilbert and Hubbs, 1916, op. cit., 51: 146.

Lionurus parvipes Gilbert and Hubbs, 1920, Bull. U. S. Nat. Mus., 100, (1), p. 562.

Deep-abyssal records and distribution.—Near Gomono Island, Dutch East Indies, 2308 meters, two specimens.

Macassar Strait, 2160 meters, one specimen.

Gulf of Tomini, Celebes, 1997, 1992 meters, three specimens.

Western Pacific, Dutch East Indies. Exclusively deep-abyssal so far as known.

Length.—?—228 mm.

Cetonus globiceps Vaillant

Macrurus globiceps Vaillant, in Filhol, *1884, Nature, Paris, 558: 185, fig. 2—Atlantic off France, North Africa and the Azores (type locality not designated; see footnote, p. 110).

Hymenocephalus crassiceps Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 214, pl. 20, fig. 1.

Hymenocephalus globiceps Vaillant, op. cit., p. 386; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 134.

Cetonus globiceps Goode and Bean, 1895, Ocean. Ichth., p. 411, fig. 344; Gilbert and Hubbs, 1916, Proc. U. S. Nat. Mus., 51: 208; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 467, fig. 227; Parr, 1946, Bull. Bingham Oceanogr. Coll., 10, (1), pp. 31, 43, figs. 9, 14.

?*Macrurus (Cetonus) globiceps* Murray and Hjort, 1912, Depths of Ocean, p. 398, fig. 271.

?*Macrurus (Cetonus)* sp. Koefoed, 1927, Rep. Sci. Res. M. Sars. No. Atl. Deep-sea Exp. 1910, 4, (1), p. 96, pl. 5, fig. 9, text figs. 30–33.

Deep-abyssal records.—Eastern Atlantic, ca. 36° N., 22° W., 4621 meters, two specimens.

Eastern Atlantic off the Azores, 2995 meters, one specimen.

Distribution.—Eastern Atlantic from the Gulf of Gascony to the Canary Islands, two deep-abyssal records and eighteen specimens in 1139–1600 meters. Western Atlantic, ca. 16° N., 63° W., one specimen, 1257 meters.

Length.—?—350 mm.

Echinomacrurus mollis Roule

Echinomacrurus mollis Roule, 1916, Bull. Inst. Océanogr. Monaco, **320**: 22
—Atlantic, ca. 31° N., 24° W., 5413 meters.

Cetonus microps Vaillant, in Richard, 1905, Bull. Inst. Océanogr. Monaco, **41**: 3; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 468 (nomen nudum).

Echinomacrurus mollis Roule, 1919, Rés. Camp. Sci. Monaco, **52**: 84, pl. 4, fig. 2; Belloc, 1949, Bull. Inst. Océanogr. Monaco, **958**: 16; ?Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947–1948, Zool., **2**, (1), p. 25.

Deep-abyssal records and distribution.—Eastern Atlantic, 5413 meters, the type.

Eastern Atlantic, ca. 43° N., 18° W., 5000–5025 meters, two specimens, a doubtful identification.

Length.—?–375 mm.

Family STEPHANOBERYCIDAE

The three species comprising this family are included in the benthic fauna for the present, although Brauer considered them to be bathypelagic. They have been caught only in trawls or dredges fishing on bottom. Two have been taken on the abyssal plain.

Stephanoberyx monae Gill

Stephanoberyx monae Gill, 1883, Proc. U. S. Nat. Mus., **6**: 258—Atlantic off United States coast, ca. 41° N., 66° W., 2295 meters.

Stephanoberyx monae Goode and Bean, 1895, Ocean. Ichth., p. 186, fig. 205, text fig.; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., **47**: 836; 1900, op. cit., fig. 353; Boulenger, 1904, Cambridge Nat. Hist., **7**: 620; Myers, 1936, Copeia, p. 118.

Deep-abyssal record.—Western Atlantic, 2295 meters, the type.

Distribution.—Western Atlantic, one deep-abyssal record in ca. 41° N.; around the West Indies (15°–16° N., 61°–63° W.) and in the Gulf of Mexico, an unstated number of specimens from seven hauls, 979–1766 meters.

Length.—?–51 mm.

Acanthochaenus luetkeni Gill

Acanthochaenus luetkeni Gill, 1884, Amer. Nat., **18**: 443—Atlantic, ca. 37° N., 69° W., 5393 meters.

Stephanoberyx gillii Goode and Bean, 1895, Ocean. Ichth., p. 187, fig. 206; Jordan and Evermann, 1896, Bull. U. S. Nat. Mus., **47**: 836; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (1), p. 65.

Acanthochaenus luetkenii Myers, 1936, Copeia, p. 18.

Deep-abyssal records and distribution.—Western Atlantic, 5393 meters, the type.

Western Atlantic, 38°–39° N., 69°–72° W., 2250, 2211 meters, three or more specimens from two hauls.

Eastern Atlantic, ca. 34° N., 33° W., 2615–2865 meters, one specimen.

Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, two specimens.

Length.—120–152 mm.

Malacosarcus macrostoma Günther

Scopelus macrostoma Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 186—Pacific, ca. 0° 33' S., 151° W., 4435 meters.

Malacosarcus macrostoma Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 30; Goode and Bean, 1895, Ocean. Ichth., p. 182.

Deep-abyssal records and distribution.—Mid-Pacific, ca. 0° 33' S., 151° W., 4435 meters, one specimen.

Mid-Pacific, ca. 13° S., 149° W., 4298 meters, one specimen.

Length.—89 mm.

Family MELAMPHAIDAE

Melamphoids are presumably all bathypelagic fishes, cosmopolitan in temperate and tropical latitudes, and seldom caught above a depth of 1000 meters. There are about twenty-seven supposedly valid species of the genus *Melamphaes* but the synonymy of many is somewhat confused, and only *M. nigrescens* Brauer can be placed below 2000 meters with any degree of certainty. Even that species may be synonymous with *M. robustus* Günther, an Atlantic species found by Beebe (1937, p. 206) and Parr (1933, p. 19) to be abundant above 2000 meters; and in this connection it is interesting to note that *M. robustus* was once taken off South Africa in a closing-net at a depth of 2850 meters (Norman, 1930, p. 345).

Considering the tendency toward a deep bathypelagic habitat exhibited by the family as a whole, it will not be surprising if some species prove to inhabit deep-abyssal waters.

Melamphaes nigrescens Brauer. Table 20.

Melamphaes nigrescens Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 283, pl. 13, fig. 4—Atlantic, Gulf of Guinea and off South Africa, and Indian Ocean, various localities (type locality not designated).

- Scopelus crassiceps* Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 185 (part).
Melamphaes crassiceps Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 28 (part); ?Koumans, 1953, Temminckia, 9: 216.
 ?*Melamphaes nigrescens* Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 99.
 ?*Melamphaes nycterinus* Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 326, pl. 16, fig. 6.
Melamphaes nigrescens Beebe, 1926, Arcturus Adv., p. 409; 1929, Zoologica, 12: 18; Norman, 1929, Ann. Mag. Nat. Hist., (10), 4: 160, 161; 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 56; Parr, 1931, Bull. Bingham Oceanogr. Coll., 2, (4), p. 40; 1933, op. cit., 3, (6), p. 14; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1265; Koefoed, 1953, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), (3), p. 19.
Melamphaes robustus Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 56.

Distribution.—Eastern Atlantic from ca. 48° N., 13° W. to ca. 31° S., 9° E. (off South Africa). Mid-Atlantic, ca. 48°-31° N. Western Atlantic off New York. Indian Ocean from ca. 34° S., 80° E. and ca. 26° S., 93° E. to the Bay of Bengal, the Arabian Sea, and ca. 4° S., 48° E. Western Pacific north of New Guinea (ca. 0° 42' S., 147° E.) and in (?) the Flores Sea (7°-8° S., 118°-129° E.). Eastern Pacific, ca. 6° N., 85° W. Known from only forty-nine specimens taken in twenty-seven hauls made between 1098 and 4000 meters. Chief area of occurrence in about 2000 meters.

Length.—30-80 mm.

Remarks.—Norman (1929, p. 160) believed Gilbert's *M. nycterinus*, known from a single specimen taken off Catalina Island (eastern Pacific) in 3865-4132 meters, to be synonymous with *nigrescens*; and he suspected that Zugmayer's three specimens identified as *nigrescens* (eastern Atlantic, 5100 meters) might actually be *robustus*.

Family ACROPOMATIDAE(?)

The following species belongs to a group of fishes (Apogonidae, Scombropidae, Acropomatidae) common among corals and weeds, with a world-wide distribution in tropical and temperate seas and with a few deep-water species. Some of the latter are known to be bathypelagic, others probably benthic, but only *Brephostoma carpenteri* has been taken in deep-abyssal waters.

Brephostoma carpenteri Alcock

Brephostoma carpenteri Alcock, 1889, Ann. Mag. Nat. Hist., (6), 4: 383—
 Indian Ocean, ca. 6° N., 90° E.

Brephostoma carpenteri Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 201, pl. 9, fig. 4; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 26; Goode and Bean, 1895, Ocean. Ichth., p. 234; Alcock and Anderson, 1898, Ill. Zool. Investigator, Fishes, pl. 18, fig. 2.

Deep-abyssal record and distribution.—Indian Ocean, Bay of Bengal, 2505–2780 meters, one specimen.

Length.—102 mm.

Remarks.—The small amount of evidence at hand points to a habitat on bottom rather than in mid-water. According to Alcock (1889, p. 383), the fact that the specimen was embedded in the head of one of the swabs attached to the trawl suggests that the swab settled over the fish as it lay on the bottom.

Family PARAPERCIDAE

Like *Brephostoma carpenteri* (above), *Macrias amissus* is the only member of its family found at any great depth. Related species are all bottom-living forms from tropical and temperate seas, a few of them archibenthic but the majority inhabitants of the shore.

Macrias amissus Gill and Townsend

Macrias amissus Gill and Townsend, 1901, Science, 14: 937—Pacific off southern Chile, ca. 45° S., 75° W.

Macrias amissus Townsend, 1936, Bull. N. Y. Zool. Soc., 39: 29, fig.

Deep-abyssal record and distribution.—Southeastern Pacific, 1920 meters, one specimen.

Length.—Ca. 1524 mm. (5 ft.).

Remarks.—This specimen is startling proof of how little is known of the animals inhabiting the deeper parts of the ocean. Unfortunately it was thrown overboard without the knowledge of the Albatross biologists and there remains only a photograph to represent the type.

Family CHIASMODONTIDAE

Although five species have been recorded exclusively in deep-abyssal waters, they are known from only one specimen each (in one case, two specimens) and probably are bathypelagic in habitat. The only specimens taken in closing nets were the type and only known example of *Kali macrodon* Norman (off South Africa, 2500–2000 meters) and one specimen of *Dysalotus alcocki* MacGilchrist (Atlantic, ca. 38° S., 28° W., 1800–2000 meters). This last form is

known from only three other specimens, the type from the Bay of Bengal in 1289 meters and two western Atlantic examples caught in 1000 and 1609 meters.

Chiasmodonts have not been taken as abundantly as melamphoids and it is not possible to determine whether the family as a whole shows a similar tendency toward a life below 1000 meters. The family distribution is cosmopolitan in tropical and temperate seas.

Family BATHYDRACONIDAE

The two species listed below are the only nototheniiform fishes reported from deep-abyssal waters. Few members of the group, which is confined to the southern hemisphere, are found even below a depth of 1000 meters.

Bathyraco antarcticus Günther

Bathyraco antarcticus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 18—Antarctic, ca. 60° S., 80° E.

Bathyraco antarcticus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 48, pl. 8, fig. A; Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 282; Norman, 1938, Disc. Rep., 18: 55.

Deep-abyssal record and distribution.—Antarctic south of Heard Island, 2304 meters, one specimen.

Length.—260 mm.

Bathyraco scotiae Dollo

Bathyraco scotiae Dollo, 1906, Proc. Roy. Soc. Edinburgh, 26: 65—Antarctic, ca. 71° S., 16° W., 2579 meters.

Bathyraco scotiae Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 240, 282, pl. 9, fig. 4; Norman, 1937, Rep. B.A.N.Z. Antarctic Res. Exp. 1929–1931, (B), 1, (2), p. 74; 1938, Disc. Rep., 18: 56.

Deep-abyssal records and distribution.—Antarctic off Coats Land, 2579 meters, two specimens.

Antarctic, ca. 64° S., 116° E., 2260 meters, one specimen.

Length.—133–145 mm.

Family ZOARCIDAE

Zoarcids form a large part of the benthic fauna of Arctic and Antarctic seas, in both littoral and deep-sea zones. To a lesser degree they are found also in some temperate latitudes, and even

extend, in deep water, to the tropical eastern Pacific, where there are some of the deepest records of these fishes. All but four of the sixteen species (seven genera) recorded from deep-abyssal waters are represented by only one or two specimens each. Of the three better-known forms only *Lycodes frigidus* has a wide geographical distribution, the other two being rather restricted in occurrence. Some zoarcids are known to move into deeper water with age. Two species have been recorded from the abyssal plain.

Lycodes frigidus Collett. Table 21.

Lycodes frigidus Collett, *1878, Vidensk. Selsk. Forh., 1878, (14), p. 45—Arctic, west of Hammerfest, Norway, 2030 meters.¹

Lycodes vahlii Collett, op. cit., p. 11 (part).

Lycodes frigidus Collett, 1880, Norske Nordhavs Exp. 1876-78, Zool., Fiske, p. 96, pl. 3, figs. 23, 24; 1905, Rep. Norwegian Fish Mar. Invest., 2, (3), p. 137; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 79; Lilljeborg, *1891, Sveriges Norges Fauna, Fisk., 2: 19; Smitt, 1895, Skand. Fiskar, p. 610, fig. 146; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 20 (part); Lönnberg, 1899, Bih. K. Svensk. Vetensk. Akad. Handl., 24, (4), (9), p. 24; 1900, Rev. Intern. Pêche Pisc., 2, (4), p. 13; Ehrenbaum, 1902, Fauna Arct., 2: 120; Jensen, 1902, Vidensk. Medd. Dansk naturh. Foren., 1901: 213; 1904, Danish Ingolf Exp., 2, (4), pp. 22, 98, pl. 5, fig. 1; Vaillant, in Roule, 1919, Rés. Camp. Sci. Monaco, 52: 133; Johnsen, 1921, Bergens Mus. Aarb., 1918-19, (6), p. 35; Barnard, 1927, Ann. So. Afr. Mus., 21: 872; Smith, 1949, Sea Fishes So. Afr., p. 365, fig. 1026; Andriashev, 1954, Fauna S.S.S.R., 53: 302, fig. 172.

Lycodes reticulatus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 77, pl. 13.

Lycodes reticulatus f. *frigida* Smitt, 1901, Bih. K. Svensk. Akad. Handl., 27, (4), (4), p. 29 (part).

?*Lycodes* sp. Essipov, 1939, Zool. Zhur., 18, (5), pp. 877, 886.

Deep-abyssal records.—Arctic west of Spitzbergen, 2750, 2438 meters, four specimens from two hauls.

Arctic, 67°-69° N., 6°-7° W., 2394, 2315 meters, seven specimens from two hauls.

Arctic from west of Hammerfest to near Jan Mayen, 2000-2195 meters, ten specimens from four hauls.

Arctic, 67°-78° N., 5° E.-10° W., 1835-1939 meters, twenty-eight specimens from four hauls.

¹I have not seen the original description. Collett (1880, p. 96) did not specify a type locality but stated that the only adult specimen taken was from *Voringen* Station 295, the locality of which, according to Sanderson Smith (1888, p. 988) was 71° 59' N., 11° 40' E.

(?) Arctic west of Spitzbergen, 2880, 3000 meters, two specimens.¹

Distribution.—Arctic from ca. 80° N., 3° E. and 78° N., 5° E. to near Iceland and the Faroes (ca. 62° N.), twelve (possibly fourteen) deep-abyssal records; others in 836–1780 meters. Not rare. Center of distribution apparently between 1600 and 2400 meters. Off Cape Point, South Africa, (?) specimens, 631–1645 meters.

Length.—46–558 mm.

Remarks.—Jensen (1904, p. 25) found that the specimen reported by Collett (1880, p. 96) in 640 meters is not *frigidus* and stated that Collett's record from 475 meters may also be an error. Jensen's studies placed the upper limit of the species, in the Arctic, at about 1000 meters.

Lycodes atlanticus Jensen. Table 22.

Lycodes atlanticus Jensen, 1902, Vidensk. Medd. Dansk naturh. Foren., 1901: 207—Atlantic off United States coast (type locality not stated).

Lycodes frigidus Goode and Bean, 1895, Ocean. Ichth., p. 305, fig. 274; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2465; 1900, op. cit., fig. 856.

Lycodes atlanticus Jensen, 1904, Danish Ingolf Exp., 2, (4), p. 25; Bigelow and Welsh, 1925, Bull. U. S. Bur. Fish., 40, (1), p. 383; Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., 53: 509.

Lycodes terrae-novae Vladykov and Tremblay, 1936, Stat. Biol. St. Laurent, Faune Flore Laurent., 1: 11 (part).

Deep-abyssal records.—Western Atlantic off coast of United States, 37°–39° N., 2603, 2155, 1869–2021 meters, an unstated number of specimens from eight hauls.

Distribution.—Western Atlantic off coast of United States, 35°–41° N., eight deep-abyssal records and an unstated number of specimens from thirteen hauls in 944–1761 meters. Center of distribution in about 1500–2200 meters with stragglers down to 2600 meters and up to 900 meters.

Length.—?–338 mm.

Lycodes platyrhinus Jensen

Lycodes platyrhinus Jensen, 1902, Vidensk. Medd. Dansk naturh. Foren., 1901: 208—Arctic, ca. 67° N., 10° W.

Lycodes frigidus Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 21 (part).

Lycodes platyrhinus Jensen, 1904, op. cit., 2, (4), p. 51, pl. 6, fig. 2, text figs. 3–5.

¹ *Lycodes* sp. Essipov (1939, pp. 877, 886), perhaps *L. frigidus*, fide Andriashev (1954, p. 302).

Lycenchelys(?) platyrhinus Andriashev, 1954, Fauna S.S.S.R., 53: 308, figs. 173, 174.

Deep-abyssal record and distribution.—Arctic between Jan Mayen and Iceland, 1847 meters, one specimen.

Length.—148.5 mm.

Lycodes cicatrifer Garman

Lycodes cicatrifer Garman, 1899, Mem. Mus. Comp. Zool., 24: 136, pl. 31, fig. 1—Pacific off Panama, ca. 6° N., 82° W.

Deep-abyssal record and distribution.—Eastern Pacific, 3057 meters, (?) specimens

Length.—?–235 mm.

Lycenchelys jordani Evermann and Goldsborough

Lycodes jordani Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 343, fig. 120—Pacific off coast of United States, ca. 43° N., 125° W., 1945 meters.

Lycenchelys jordani Taranetz, 1937, Bull. Pac. Sci. Inst. Fish. Oceanogr., 11: 161.

Lycodes jordani Böhlke, 1953, Stanf. Ichth. Bull., 5: 101.

Deep-abyssal record.—Northeastern Pacific, 1945 meters, one specimen.

Distribution.—Northeastern Pacific, one deep-abyssal record and one specimen off Sitka Sound, ca. 57° N., in 1687 meters.

Length.—Ca. 215–336 mm.

Lycenchelys antarcticus Regan

Lycenchelys antarcticus Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 243, pl. 9, fig. 3—Antarctic, ca. 62° S., 41° W.

Lycenchelys antarcticus Norman, 1938, Disc. Rep., 18: 81, fig. 52.

Deep-abyssal record and distribution.—Antarctic near the South Orkney Islands, 3246 meters, one specimen.

Length.—128 mm.

Lycenchelys albus Vaillant

Lycodes albus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 391, pl. 26, fig. 1—between France and the Azores, *Talisman* Station 133 (see footnote, p. 110).

Lycenchelys albus Goode and Bean, 1895, Ocean. Ichth., p. 526; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1055, fig. 436.

Deep-abyssal record and distribution.—Eastern Atlantic, 3975 meters, two specimens.

Length.—?—199 mm.

Lycodonus ophidium Jensen

Lycenchelys ophidium Jensen, 1902, Vidensk. Medd. Dansk naturh. Foren., 1901: 212—Atlantic south of Iceland, ca. 61° N., 19° W.

Lycodes muraena Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 20 (part).

Lycodonus ophidium Jensen, 1904, op. cit., 2, (4), p. 97.

Deep-abyssal record and distribution.—North Atlantic, 1992 meters, one specimen.

Length.—118 mm.

Lycodonus mirabilis Goode and Bean. Table 23.

Lycodonus mirabilis Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 208—Atlantic off United States coast, ca. 38° N., 73° W., 1353 meters.

Lycodonus mirabilis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 81; Goode and Bean, 1895, Ocean. Ichth., p. 312, fig. 280; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2474; 1900, op. cit., fig. 862; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 137, pl. 6, fig. 6; Jensen, 1952, Medd. Grønland, 142, (7), p. 27, pl. 1, fig. 2, a, pl. 2, figs. 2, b-d.

Deep-abyssal records.—Western Atlantic off coast of United States, 2394, 2295 meters, an unstated number of specimens from two hauls.

Western Atlantic off coast of United States, 1869–1977 meters, an unstated number of specimens from five hauls.

Distribution.—Western Atlantic south of Newfoundland (ca. 42° N., 51° W.) and off the United States coast (35°–41° N.), seven deep-abyssal records and an unknown number of specimens from ten hauls in 1100–1813 meters. Baffin Bay, two specimens in 850 meters. Apparently an inhabitant of the upper deep-abyssal zone, center of distribution perhaps in 1600–2000 meters. The species has been caught above 1550 meters only four times and in three of these hauls (850, 1100 and 1353 meters) the specimens were young. In the fourth instance the length is not known.

Length.—70–290 mm.

Lycodonus flagellicauda Jensen

Lycenchelys flagellicauda Jensen, 1902, Vidensk. Medd. Dansk naturh. Foren., 1901: 210—Arctic west of Spitzbergen, ca. 79° N., 5° E., 839 meters.

Lycodes muraena Collett, *1878, Vidensk. Selsk. Forh., 1878, (14), p. 74 (part); 1880, Norske Nordhavs Exp., Zool., Fiske, p. 116 (part), pl. 4, figs. 29, 31; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 79, pl. 12, fig. A; Lilljeborg, *1891, Sveriges Norges Fauna, Fisk., 2: 25 (part); Smitt, 1895, Skand. Fiskar, 2: 616 (part), fig. 152; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 20 (part).

Lycodonus flagellicauda Jensen, 1904, op. cit., 2, (4), p. 94, figs. 29-33; 1938, Faune Ichth. Atl. Nord, 18, figs. 1-5; Collett, 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 140; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 136.

Deep-abyssal record.—Arctic, ca. 69° N., 8° W., 1835 meters, one specimen.

Distribution.—Arctic only, from near Spitzbergen (ca. 79° N.) to north of Iceland and in the Faroe Channel (ca. 60° N.), one deep-abyssal record, five examples in 1750 meters and numerous specimens in 839-1394 meters. Probably not a deep-abyssal species.

Length.—70-217 mm.

Maynea bulbiceps Garman

Maynea bulbiceps Garman, 1899, Mem. Mus. Comp. Zool., 24: 140, pl. E, fig. 1—Pacific off Panama, ca. 6° N., 86° W.

Maynea bulbiceps Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 364.

Deep-abyssal record and distribution.—Eastern Pacific, 2690 meters, (?) specimens.

Length.—502 mm.

Maynea conorhynchus Garman

Gymnelis conorhynchus Garman, 1899, Mem. Mus. Comp. Zool., 24: 131, pl. 31, fig. 2—Pacific off Panama, ca. 6° N., 80° W.

Maynea conorhynchus Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 364.

Deep-abyssal record and distribution.—Eastern Pacific, 3279 meters, (?) specimens.

Length.—229 mm.

Bothrocaropsis elongata Garman

Bothrocaropsis elongata Garman, 1899, Mem. Mus. Comp. Zool., 24: 129, pl. 33, fig. 2—Pacific off Panama, ca. 7° N., 79°-80° W.

Deep-abyssal record.—Eastern Pacific off Panama, 1865 meters, an unstated number of specimens.

Distribution.—Eastern Pacific off Panama, one deep-abyssal record and an unstated number of specimens in 1271 meters.

Length.—?-305 mm.

Melanostigma pammelas Gilbert

Melanostigma pammelas Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 472, pl. 35—Pacific off California, ca. 36° N., 121° W., 698 meters.

Melanostigma pammelas Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2479, 2869; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 345, fig. 124; Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 368; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 15; Bolin and Myers, 1950, Stanf. Ichth. Bull., 3: 203–208; Böhlke, 1953, op. cit., 5: 101.

Deep-abyssal record.—Eastern Pacific off San Nicolas Island, ca. 33° N., 1982–2012 meters, an unstated number of specimens from one haul.

Distribution.—Eastern Pacific from Monterey Bay to off San Diego, one deep-abyssal record and twenty-two specimens taken between 97–216 meters and 1398–1629 meters. An archibenthic form. Rare below 1000 meters and probably accidental in deep-abyssal waters.

Length.—56–304 mm.

Remarks.—Gilbert (1915, p. 368) stated that the species may be pelagic. Bolin and Myers (1950, pp. 203–208) reported two captures in nets that brought up several bathypelagic fishes, thus adding evidence to support Gilbert's suggestion and raising considerable doubt of the validity of the one deep-abyssal record. However, twenty of the twenty-two specimens were taken in bottom-fishing appliances, with as many as three examples per haul, and the species is therefore included here in the list of benthic forms.

M. pammelas and *M. atlanticum* may be synonymous.

Melanostigma atlanticum Koefoed

Melanostigma atlanticum Koefoed, 1952, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 19, pl. 2, fig. D—Atlantic, ca. 57° N., 11° W., 1853 meters.

Melanostigma gelatinosum Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 209; 1895, Ocean. Ichth., p. 314, fig. 284; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2479; ? Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 20; ? Barnard, 1927, Ann. So. Afr. Mus., 21: 874; ? Smith, 1949, Sea Fishes So. Afr., p. 365, fig. 1025.

Deep-abyssal records.—Eastern Atlantic, ca. 57° N., 11° W., 1853 meters, one specimen.

(?) Atlantic off South Africa, ca. 33° S., 16° E., 2561 meters, one specimen.

Distribution.—Eastern Atlantic, one deep-abyssal record. Western Atlantic off the United States coast, 37°–39° N., an unstated number of specimens from eleven stations in 723–1172 meters. (?) South Africa, one deep-abyssal record.

Length.—86–140 mm.

***Pachycara obesa* Zugmayer**

Pachycara obesa Zugmayer, 1911, Bull. Inst. Océanogr. Monaco, **193**: 12
—Gulf of Gascony, ca. 45° N., 6° W.

Pachycara obesa Zugmayer, 1911, Rés. Camp. Sci. Monaco, **35**: 134, pl. 6, fig. 6; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 1056; Belloc, 1949, Bull. Inst. Océanogr. Monaco, **958**: 13, pl. 3.

Pachycarichthys obesa Whitley, 1931, Australian Zool., **6**: 334.

Deep-abyssal record and distribution.—Eastern Atlantic, 4780 meters, one specimen.

Length.—385 mm.

Family LYCODAPODIDAE

The family, with only one genus, contains ten species ranging from the Okhotsk Sea across the north Pacific and south to the Gulf of Panama, and one species from the Strait of Magellan. Except for *L. fierasfer* all of these fishes are archibenthic.

***Lycodapus fierasfer* Gilbert**

Lycodapus fierasfer Gilbert, 1890, Proc. U. S. Nat. Mus., **13**: 108—Pacific off United States coast and in the Gulf of California (type locality not stated).

Lycodapus fierasfer Gilbert, 1896, Rep. U. S. Comm. Fish, **1893**: 455, 471, pl. 32; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., **47**: 2493; Garman, 1899, Mem. Mus. Comp. Zool., **24**: 139; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., **26**: 345; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., **52**: 16; Hubbs and Schultz, 1932, Contr. Can. Biol. Fish., **7**: 323; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, **68**: 195, fig. 132; Böhlke, 1953, Stanf. Ichth. Bull., **5**: 101.

Deep-abyssal records.—Eastern Pacific, ca. 31° N., 118° W., 1968 meters, one specimen.

Eastern Pacific in the Gulf of California, 1838 meters, (?) specimens.

Distribution.—Eastern and north Pacific from Bering Sea to the Gulf of Panama. Depth range between 111–120 and 640 meters south to British Columbia; one deep-abyssal record and in 698–1103 meters off the United States coast; one deep-abyssal record

in the Gulf of California; and in 1644 meters in the Gulf of Panama. More than sixteen specimens reported.

Length.—63.5–152 mm.

Family DEREPODICHTHYIDAE

The family contains only one species.

Derepodichthys alepidotus Gilbert

Derepodichthys alepidotus Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 456
—Pacific off the Queen Charlotte Islands.

Derepodichthys alepidotus Jordan and Evermann, 1898, Bull. U. S. Nat. Mus.,
47: 2480; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68:
197, fig. 134.

Deep-abyssal record and distribution.—Northeastern Pacific, ca. 52° N., 132° W., 2904 meters, one specimen.

Length.—110 mm.

Family BROTULIDAE

Including the eleven found on the abyssal plain, fifty-seven species of brotulid fishes (twenty-four genera) have been reported from deep-abyssal waters. Most of the species live in tropical and temperate latitudes, the only exceptions being one species from Greenland and one Antarctic form, the latter a deep-abyssal one. There are shore and fresh-water, as well as deep-sea forms. Young stages of some oceanic species live pelagically for an undetermined length of time.

Deep-abyssal brotulids do not, in general, show the wide geographical distribution that is seen in some families. Seemingly correlated with this more limited distribution is a restricted bathymetric range. However, there are enough examples of species reported from widespread areas to suggest that future investigations will increase the number. *Mixonus caudalis* is known from the Indian Ocean and the eastern Pacific and has been taken only once above the deep-abyssal zone (1524 meters) while *Acanthonus armatus* and *Bassozetus compressus* have been caught only in deep-abyssal waters but in both the western Pacific and eastern Atlantic.

Pale or colorless and sometimes blind forms often develop under suitable conditions. Several cave-dwelling species fall into this category, as well as a few burrowing shore forms; in deep-abyssal

waters there are eleven species with rudimentary eyes. In the deep sea above 2000 meters there are only two blind species and of these *Aphyonius mollis* Goode and Bean may eventually prove to be deep-abyssal, having been caught only once, in 1747 meters. The other, *Barathronus diaphanus* Brauer, came from 918, 1289 and 1756 meters. Although few of these blind, or nearly blind, species have been described from fresh specimens only three show much pigment beyond the black peritoneum and gill-cover membranes.

Monomitopus metriostomus Vaillant has been omitted here, the one deep-abyssal specimen having proved to be a different fish (Nybelin, 1953).

Nybelin (1951, pp. 16, 19, 24) reported from deep-abyssal waters in the north Atlantic the following three unnamed brotulids: *Porogadus* sp., one specimen, 5250–5300 meters (ca. 1° N., 18° W.); *Barathrites* sp., one specimen, 5044–5033 meters (ca. 12° N., 52° W.); and *Leucochlamys* sp., two specimens, 4590–5600 meters (ca. 40° N., 35° W. and 9° N., 26° W.).

Monomeropus malispinosus Garman

Monomeropus malispinosus Garman, 1899, Mem. Mus. Comp. Zool., 24: 158, pl. 40, fig. 2—Pacific off Panama, ca. 7° N., 79° W.

Deep-abyssal record and distribution.—Eastern Pacific, 1865 meters, one specimen.

Length.—216 mm.

Dicrolene filamentosa Garman

Dicrolene filamentosa Garman, 1899, Mem. Mus. Comp. Zool., 24: 149, pl. F, fig. 1, pl. 75, fig. 2—Pacific off Mexico, ca. 16° N., 99° W., 1207 meters.

Deep-abyssal record.—Eastern Pacific, ca. 7° N., 79° W., 1865 meters, (?) specimens.

Distribution.—Eastern Pacific off Mexico and in the Gulf of Panama, one deep-abyssal record and an unstated number of specimens from three hauls in 935–1207 meters.

Length.—?–432 mm.

Dicrolene nigra Garman

Dicrolene nigra Garman, 1899, Mem. Mus. Comp. Zool., 24: 150, pl. 37, fig. 2, pl. 75, fig. 1—Pacific off the Galapagos Islands, ca. 0° 57' S., 89° W., 769 meters.

Dicrolene nigra Trotter, 1926, Zoologica, 8: 114; Gregory, 1933, Trans. Amer. Phil. Soc., 23, (2), p. 378, fig. 256.

Deep-abyssal record.—Eastern Pacific, ca. 7° N., 79° W., 1865 meters, (?) specimens.

Distribution.—Eastern Pacific off Panama, Cocos Island, and the Galapagos Islands, at least thirty-seven specimens known, one deep-abyssal record, others in 769–1644 meters. Probably accidental in the deep-abyssal zone.

Length.—125–481 mm.

Remarks.—In one haul made at a depth of 1143 meters near Cocos Island, thirty-one specimens were caught, only six of them adult.

Barathrodemus manatinus Goode and Bean

Barathrodemus manatinus Goode and Bean, 1883, Bull. Mus. Comp. Zool., 10: 200—Atlantic off United States coast, ca. 33° N., 76° W., 1183 meters.

Barathrodemus manatinus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 100; Goode and Bean, 1895, Ocean. Ichth., p. 332, fig. 294; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2517; 1900, op. cit., fig. 880.

Deep-abyssal record.—Western Atlantic, ca. 37° N., 73° W., 2552 meters, (?) specimens.

Distribution.—Western Atlantic, 33°–37° N., 73°–76° W., one deep-abyssal record and at least three specimens from two hauls in 1624 and 1183 meters.

Length.—?–159 mm.

Barathrodemus nasutus Smith and Radcliffe

Barathrodemus nasutus Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 152, pl. 10, fig. 2—Gulf of Tomini, Celebes.

Barathrodemus nasutus Cockerell, 1916, Ann. Mag. Nat. Hist., (8), 18: 323; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 425, fig. 71.

Deep-abyssal records and distribution.—Western Pacific, Gulf of Tomini, Celebes, Dutch East Indies, 1997, 1992 meters, three specimens from two hauls.

Length.—?–172 mm.

Barathrites iris Zugmayer

Barathrites iris Zugmayer, 1911, Bull. Inst. Océanogr. Monaco, 193: 11—Atlantic, ca. 31° N., 42° W., 3465 meters.

Barathrites iris Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 132, pl. 6, fig. 3; Parr, 1933, Bull. Bingham Oceanogr. Coll., 3, (6), p. 46; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1063, fig. 442; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 14, pl. 3.

Deep-abyssal record.—Mid-Atlantic on or west of the mid-Atlantic ridge, ca. 31° N., 42° W., 3465 meters, one specimen.

Distribution.—Mid-Atlantic, one deep-abyssal record. Western Atlantic near the Bahamas, one specimen in 1645–1747 meters.

Length.—233–250 mm.

Barathrites abyssorum Roule

Barathrites abyssorum Roule, 1916, Bull. Inst. Océanogr. Monaco, **320**: 17
—Atlantic, ca. 30° N., 25° W.

Barathrites Roule, 1915, C. R. Acad. Sci. Paris, **161**: 56.

Barathrites abyssorum Roule, 1919, Rés. Camp. Sci. Monaco, **52**: 71, pl. 2, fig. 3; 1934, Poiss. Monde Viv. Eaux, **7**: 191–192, pl. 11, text fig.; Belloc, 1949, Bull. Inst. Océanogr. Monaco, **958**: 14.

Deep-abyssal record and distribution.—Eastern Atlantic, 5285 meters, one specimen.

Length.—260 mm.

Bassogigas crassus Vaillant

Bythites crassus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 279, pl. 25, fig. 1—Atlantic between France and the Azores (see footnote, p. 110).

Neobythites crassus Goode and Bean, 1895, Ocean. Ichth., p. 327; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, **4**, (1), p. 133, pl. 6, fig. 1; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., **70**: 1064, fig. 443.

Bassogigas crassus Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), **5**, (16), p. 76, pl. 5, figs. 1–3, pl. 6, figs. 1–3.

Deep-abyssal records.—Eastern Atlantic, 4255 meters, the type.

Mid-Atlantic on the mid-Atlantic ridge, ca. 45° N., 25° W., 3120 meters, one specimen.

Eastern Atlantic, ca. 35° N., 8° W., 2150–2300 and 2055 meters, two specimens.

Distribution.—Eastern and mid-Atlantic, four deep-abyssal records and eleven specimens in one haul in 1797 meters (ca. 50° N., 11° W.). Probably a deep-abyssal species.

Length.—300–550 mm.

Bassogigas pterotus Alcock

Neobythites pterotus Alcock, 1890, Ann. Mag. Nat. Hist., (6), **6**: 210, 297
—Bay of Bengal, ca. 18° N., 85° E., 2395 meters.

Neobythites pterotus Alcock, 1891, op. cit., (6), **7**: 11; 1891, op. cit., (6), **8**: 30; 1894, Ill. Zool. Investigator, Fishes, pl. 11, fig. 4; Alcock and McArdle, 1900, op. cit., pl. 29, fig. 1.

Bassogigas pterotus Goode and Bean, 1895, Ocean. Ichth., pp. 328, 529;
Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 154;
Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 86.

Neobythites (Bassogigas) pterotus Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 83.

Deep-abyssal records and distribution.—North Indian Ocean, ca. 11° N., 88° E., 3197 meters, one specimen.

North Indian Ocean, 2395 meters, the type.

North Indian Ocean, ca. 11° N., 74° E., 1829 meters, one specimen.

Probably a deep-abyssal species.

Length.—Ca. 209-300 mm.

***Bassogigas aequatoris* Smith and Radcliffe**

Bassogigas aequatoris Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 153, pl. 10, fig. 3—Pacific, Gulf of Tomini, Celebes.

Bassogigas aequatoris Cockerell, 1916, Ann. Mag. Nat. Hist., (8), 18: 324;
de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 326, fig. 72.

Deep-abyssal record and distribution.—Western Pacific, 1992 meters, one specimen.

Length.—288 mm.

***Bassogigas digittatus* Garman**

Holcomycteronus digittatus Garman, 1899, Mem. Mus. Comp. Zool., 24: 163, pl. 36, fig. 1, pl. 76, fig. 2—eastern Pacific from the Gulf of California to off northern South America (type locality not designated).

Bassogigas digittatus Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 86.

Deep-abyssal records and distribution.—Ca. 10° N., 96° W., 4082 meters, (?) specimens.

Ca. 14° N., 98° W., 3436 meters, (?) specimens.

Ca. 2° N., 83° W., 3333 meters, (?) specimens.

Ca. 25° N., 109° W., 2904 meters, (?) specimens.

Ca. 2° N., 82° W., 2196 meters, (?) specimens.

Eastern Pacific only, 2°-25° N., 82°-109° W. Probably chiefly or exclusively deep-abyssal and also reaching the abyssal plain.

Length.—?-356 mm.

***Bassogigas koefoedi* Nybelin**

Bassogigas koefoedi Nybelin, 1953, 14 Intern. Zool. Congr. Copenhagen, p. 2
—Atlantic, ca. 27° N., 14° W.

Bassogigas (Holcomycteronus) digittatus Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 140, pl. 6, fig. 2.

Deep-abyssal record and distribution.—Eastern Atlantic, 2603 meters, one specimen.

Length.—310 mm.

Bassogigas brucei Dollo

Neobythites brucei Dollo, 1905–06, Proc. Roy. Soc. Edinburgh, 26: 172—Antarctic, ca. 67° S., 36° W.

Neobythites brucei Regan, 1913, Trans. Roy. Soc. Edinburgh, 49: 238, pl. 3, fig. 2.

Holcomycteronus brucei Regan, 1914, Brit. Antarctic (Terra Nova) Exp. 1910, Zool., 1: 39.

Bassogigas brucei Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 86.

Deep-abyssal record and distribution.—Antarctic, Weddell Sea, 4571 meters, one specimen.

Length.—350 mm.

Bassogigas grandis Günther

Sirembogigas grandis Günther, 1877, Ann. Mag. Nat. Hist., (4), 20: 437—Pacific off Japan, ca. 34° N., 140° E.

Neobythites grandis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 100, pl. 21, fig. A.

Bassogigas grandis Goode and Bean, 1895, Ocean. Ichth., p. 529; Tanaka, 1908, Jour. Coll. Sci. Imp. Univ. Tokyo, 23, (13), p. 17, pl. 2, fig. 1.

Deep-abyssal record.—Western Pacific, 3465 meters, the type.

Distribution.—Western Pacific off Japan, one deep-abyssal record and one specimen from an unknown depth.

Length.—750, 1250 mm.

Bassogigas gilli Goode and Bean

Bassogigas gilli Goode and Bean, 1895, Ocean. Ichth., pp. 328, 529, fig. 291—Atlantic off United States coast, ca. 39° N., 70° W.

Bassogigas gilli Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2515; 1900, op. cit., fig. 879.

Deep-abyssal record and distribution.—Western Atlantic, 2022 meters, one specimen.

Length.—463 mm.

Alcockia rostrata Günther

Porogadus rostratus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 113, pl. 4, fig. B—Pacific north of Celebes, ca. 2° N., 124° E.

Alcockia rostrata Goode and Bean, 1895, Ocean. Ichth., p. 329; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 429, fig. 74.

Deep-abyssal record and distribution.—Western Pacific, 3932 meters, one specimen.

Length.—292 mm.

Bassozetus normalis Gill

Bassozetus normalis Gill, 1883, Proc. U. S. Nat. Mus., 6: 259—Atlantic off United States coast, ca. 39° N., 68° W., 2844 meters.

Bassozetus normalis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 99; Goode and Bean, 1895, Ocean. Ichth., p. 322, fig. 287; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2507; 1900, op. cit., fig. 875.

Deep-abyssal records and distribution.—Western Atlantic, ca. 24° N., 84° W., 3512 meters, (?) specimens.

Western Atlantic, ca. 39° N., 68° W., 2844 meters, (?) specimens.

Western Atlantic, ca. 28° N., 87° W., 2615 meters, (?) specimens.

Western Atlantic, Gulf of Mexico, 2104-2194 meters, two specimens (*Oregon Station 1303*, 28° 47' N., 87° 50' W., May 26, 1955).

Western Atlantic, ca. 16° N., 61° W., 2068 meters, (?) specimens.

Western Atlantic only, from the Lesser Antilles, the Gulf of Mexico, and off New Jersey. Exclusively deep-abyssal as far as known.

Length.—170-329 mm.

Bassozetus taenia Günther

Bathyonus taenia Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 110, pl. 23, fig. A—Atlantic, ca. 2° N., 20° W.

Bassozetus taenia Goode and Bean, 1895, Ocean. Ichth., p. 323; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2510; Roule, 1935, Bull. Inst. Océanogr. Monaco, 674: 6; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1062, fig. 441; Nybelin, 1953, 14 Intern. Zool. Congr. Copenhagen, p. 3.

Bassozetus sp. Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947-1948, Zool., 2, (1), pp. 15, 19.

Deep-abyssal records and distribution.—Mid-Atlantic east of the mid-Atlantic ridge, ca. 9° N., 26° W., 5610-5600 meters, one specimen.

Western Atlantic, ca. 12° N., 52° W., 5044-5033 meters, two specimens.

Mid-Atlantic east of the mid-Atlantic ridge, 4571 meters, the type.

Known so far only from the abyssal plain.

Length.—?–254 mm.

Remarks.—Roule (1935, p. 6) reported this species from Madeira, but without description or depth data.

Bassozetus nasus Garman

Bassozetus nasus Garman, 1899, Mem. Mus. Comp. Zool., 24: 159, 361, pls. 77, 78—Pacific off Central America (type locality not designated).

Bassozetus nasus Lendenfeld, 1905, op. cit., 30: 197, pl. 4, figs. 14–17; Trojan, 1906, op. cit., p. 245, pls. 5, 6.

Deep-abyssal records and distribution.—Eastern Pacific, 4°–14° N., 80°–98° W., 3436, 3240, 3057 meters, an unstated number of specimens from three hauls.

Length.—?–279 mm.

Bassozetus compressus Günther

Bathynectes compressus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 20—type locality not stated, designated as *Challenger* Station 184, ca. 12° S., 145° E., 2560 meters, the locality of the specimen figured by Günther, 1887.

Bathyonus compressus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 109, pl. 22, fig. A.

Bassozetus compressus Goode and Bean, 1895, Ocean. Ichth., p. 322; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2508; Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 157; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1062; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 431.

Deep-abyssal records and distribution.—Mid-Atlantic east of the mid-Atlantic ridge, ca. 1° N., 26° W., 2744 meters, one specimen.

Western Pacific south of New Guinea, 2560 meters, two specimens.

Western Pacific off the Philippines, ca. 16° N., 119° E., 1920 meters, one specimen.

Length.—114–432 mm.

Bassozetus elongatus Smith and Radcliffe

Bassozetus elongatus Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 157, pl. 11, fig. 4—Gulf of Tomini, Celebes.

Bassozetus elongatus Cockerell, 1916, Ann. Mag. Nat. Hist., (8), 18: 322; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 433, fig. 75; Böhlke, 1953, Stanf. Ichth. Bull., 5: 102.

Deep-abyssal record and distribution.—Western Pacific, 1992 meters, two(?) specimens.

Length.—480 mm.

Bassozetus glutinosus Alcock

Bathyonus glutinosus Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 211—Bay of Bengal, ca. 18° N., 85° E., 2395 meters.

Bathyonus glutinosus Alcock, 1891, op. cit., (6), 7: 11; 1892, Ill. Zool. Investigator, Fishes, pl. 1, fig. 3.

Bassozetus glutinosus Goode and Bean, 1895, Ocean. Ichth., p. 322; Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 88; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 77.

Bathyonus (Bassozetus) glutinosus McArdle, 1901, Ann. Mag. Nat. Hist., (7), 8: 518.

Deep-abyssal records.—North Indian Ocean, ca. 18° N., 85° E., 2395 meters, five specimens.

North Indian Ocean, Gulf of Aden, 2312 meters, one specimen.

North Indian Ocean, ca. 10° N., 74° E., 2104-2140 meters, (?) specimens.

North Indian Ocean, ca. 7° N., 76° E., 1840 meters, (?) specimens.

Distribution.—North Indian Ocean in the Bay of Bengal and the Arabian Sea, four deep-abyssal records and an unstated number of specimens from three hauls in 1163-1629 meters.

Length.—178-270 mm.

Bassozetus oncercephalus Vaillant

Sirembo oncercephalus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 277, 387, pl. 24, fig. 6—Atlantic off Cape Verde (see footnote, p. 110).

Dicromita oncercephala Goode and Bean, 1895, Ocean. Ichth., p. 321; Fowler, 1925, Amer. Mus. Nov., 162: 5 (subgenus *Pterodicromita*); 1936, Bull. Amer. Mus. Nat. Hist., 70: 1060, fig. 440.

Monomitopus oncercephalus Fowler, 1936, op. cit., p. 1329.

[*Bassozetus*] *oncercephalus* Norman, 1929, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal record and distribution.—Eastern Atlantic, 3200 meters, one specimen.

Length.—221 mm.

Eretmichthys pinnatus Garman

Eretmichthys pinnatus Garman, 1899, Mem. Mus. Comp. Zool., 24: 165, 362, pl. 35, figs. 1-4, pl. 79, fig. 2—Pacific off Panama and Ecuador (type locality not designated).

Deep-abyssal records.—Eastern Pacific, ca. $0^{\circ} 36' S.$, $86^{\circ} W.$, 2417 meters, (?) specimens.

Eastern Pacific, ca. $5^{\circ} N.$, $86^{\circ} W.$, 1951 meters, (?) specimens.

Distribution.—Eastern Pacific, ca. $0^{\circ} 36' S.$, $86^{\circ} W.$ and ca. $5^{\circ} N.$, 85° – $86^{\circ} W.$, two deep-abyssal records and an unstated number of specimens from one haul in 1789 meters.

Length.—?–432 mm.

Eretmichthys ocella Garman

Eretmichthys ocella Garman, 1899, Mem. Mus. Comp. Zool., 24: 166, 362, pl. 37, fig. 1, pl. 79, fig. 1—Pacific off Panama, ca. $7^{\circ} N.$, $79^{\circ} W.$

Deep-abyssal record and distribution.—Eastern Pacific off Panama, 2322 meters, one specimen.

Length.—381 mm.

Eretmichthys remifer Smith and Radcliffe

Eretmichthys remifer Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 155, pl. 11, fig. 2—Gulf of Tomini, Celebes.

Eretmichthys remifer Cockerell, 1916, Ann. Mag. Nat. Hist., (8), 18: 322; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 428, fig. 73.

Deep-abyssal record and distribution.—Western Pacific, 1997 meters, one specimen.

Length.—272 mm.

Porogadus miles Goode and Bean

Porogadus miles Goode and Bean, 1885, Proc. U. S. Nat. Mus., 8: 602—Atlantic off coast of United States, ca. $38^{\circ} N.$, $73^{\circ} W.$

Porogadus miles Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 113; Goode and Bean, 1895, Ocean. Ichth., p. 334, fig. 292; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2520; 1900, op. cit., fig. 881; Gilchrist, 1906, Mar. Invest. So. Afr., 4: 159; Thompson, *1916, Prov. Cape Good Hope Mar. Biol. Rep., 3: 107; Barnard, 1927, Ann. So. Afr. Mus., 21: 881; Smith, 1949, Sea Fishes So. Afr., p. 364, fig. 1022.

Deep-abyssal records.—Western Atlantic, 2136 meters, the type.

Western Atlantic, Gulf of Mexico, 2104–2194 meters, one specimen (Oregon Station 1303, $28^{\circ} 47' N.$, $87^{\circ} 50' W.$, May 26, 1955).

Distribution.—Western Atlantic off the northern coast of the United States and in the Gulf of Mexico, two deep-abyssal specimens. South Africa off Cape Point, one specimen in 1280–1463 meters.

Length.—153–291 mm.

Porogadus nudus Vaillant

Porogadus nudus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 262, pl. 24, fig. 2—Atlantic off North Africa, 2324 meters (see footnote, p. 110).

Celema nuda Goode and Bean, 1895, Ocean. Ichth., p. 330; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1067, fig. 446.

Porogadus nudus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 404; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal records and distribution.—Eastern Atlantic off Cape Verde, 3200 meters, one specimen, a doubtful identification.

Eastern Atlantic, Banc d'Arguin (North Africa), 2324 meters, three specimens.

Length.—?—202 mm.

Porogadus catena Goode and Bean

Bathyonus catena Goode and Bean, 1885, Proc. U. S. Nat. Mus., 8: 603—Gulf of Mexico, ca. 28° N., 87° W.

Bathyonus catena Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 111.

Bassozetus catena Goode and Bean, 1895, Ocean. Ichth., p. 323, fig. 286; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2509; 1900, op. cit., figs. 876, 876, a.

Porogadus catena Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal record and distribution.—Western Atlantic in the Gulf of Mexico, 2683 meters, two specimens.

Length.—227–237 mm.

Porogadus gracilis Günther

Bathymectes gracilis Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 21—Pacific south of New Guinea, ca. 12° S., 145° E.

Porogadus gracilis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 112, pl. 16, fig. B; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 404; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Moebia gracilis Goode and Bean, 1895, Ocean. Ichth., p. 331; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 436, fig. 77.

Deep-abyssal record and distribution.—Western Pacific, 2560 meters, one specimen.

Length.—229 mm.

Porogadus trichiurus Alcock

Dermatorus trichiurus Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 298—Arabian Sea, ca. 11° N., 74° E., 1829 meters.

Dermatorus trichiurus Alcock, 1891, op. cit., (6), 7: 11; 1892, Ill. Zool. Investigator, Fishes, pl. 1, fig. 1; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 90; Goode and Bean, 1895, Ocean. Ichth., p. 325; McArdle, 1901, Ann. Mag. Nat. Hist., (7), 8: 518.

Porogadus trichiurus Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 77.

Deep-abyssal records.—Indian Ocean, Gulf of Aden, 2312 meters, two specimens.

Arabian Sea, ca. 10° N., 74° E., 2104-2140 meters, (?) specimens.

Arabian Sea, 7°-11° N., 74°-76° E., 1893, 1840, 1829 meters, two specimens from two hauls and an unstated number from a third haul.

Distribution.—North Indian Ocean in the Gulf of Aden, the Arabian Sea, and near Zanzibar; five deep-abyssal records, one specimen in 1789 meters and an unstated number from two hauls in 1628 and 1336-1410 meters.

Length.—130-180 mm.

Porogadus melanocephalus Alcock

Dermatorus melanocephalus Alcock, 1891, Ann. Mag. Nat. Hist., (6), 8: 32—Bay of Bengal, ca. 12° N., 90° E., 3006 meters.

Dermatorus melanocephalus Goode and Bean, 1895, Ocean. Ichth., p. 325; Alcock and Anderson, 1898, Ill. Zool. Investigator, Fishes, pl. 21, fig. 4; Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 91.

Porogadus melanocephalus Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal records and distribution.—North Indian Ocean, 11°-12° N., 88°-90° E., 3197, 3006 meters, two specimens.

Length.—?-203 mm.

Porogadus subarmatus Vaillant

Porogadus subarmatus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 265, pl. 24, fig. 3—Atlantic off Cape Verde, 3200 meters (see footnote, p. 110).

Celema subarmata Goode and Bean, 1895, Ocean. Ichth., p. 330; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1068.

Porogadus subarmatus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 404; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal records and distribution.—Eastern Atlantic, 3200 meters, eleven specimens from one haul.

Western Atlantic, Gulf of Mexico, 2104–2194 meters, two specimens (*Oregon Station 1303*, 28° 47' N., 87° 50' W., May 26, 1955).

Length.—176–222 + mm.

Remarks.—The type of the species was a ripe female, suggesting that the fishes had congregated for spawning, as mentioned by Goode and Bean (1895, p. 330). It is somewhat amazing that from this same haul the *Talisman* collected four other brotulid species, three of them new (one *Porogadus nudus*, three *P. microphthalmus*, two *Mixonus laticeps* and one *Bassozetus oncercephalus*). In color they all range from pure white to rosy white, except for the black peritoneum and opercular linings.

Porogadus longiceps Garman

Porogadus longiceps Garman, 1899, Mem. Mus. Comp. Zool., 24: 153, 361, pl. F, fig. 2, pl. 76, fig. 1—Pacific off Colombia and Panama, 4°–7° N., 79°–86° W. (type locality not designated).

Deep-abyssal records.—Eastern Pacific, 3279, 3240, 1865 meters, an unstated number of specimens from three hauls.

Distribution.—Eastern Pacific, three deep-abyssal records and one very young specimen in 245 meters.

Length.—140–495 mm.

Porogadus atripectus Garman

Porogadus atripectus Garman, 1899, Mem. Mus. Comp. Zool., 24: 154, pl. 37, fig. 3—Pacific off Mexico and Central America (type locality not designated).

Deep-abyssal records.—Eastern Pacific, ca. 7° N., 79° W., 2322 meters, (?) specimens.

Eastern Pacific, ca. 5° N., 86° W., 1951 meters, (?) specimens.

Distribution.—Eastern Pacific, two deep-abyssal records and an unstated number of specimens from one haul in 1412 meters (ca. 16° N., 100° W.).

Length.—?–318 mm.

Porogadus promelas Gilbert

Porogadus promelas Gilbert, 1891, Proc. U. S. Nat. Mus., 14: 546—Gulf of California, ca. 27° N., 111° W., 1839 meters.

Moebia promelas Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2511; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 16.

Porogadus promelas Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87; Böhlke, 1953, Stanf. Ichth. Bull., 5: 102.

Deep-abyssal records.—Eastern Pacific off Lower California, ca. 31° N., 118° W., 1968 meters, one specimen.

Eastern Pacific, Gulf of California, 1839 meters, five specimens.

Distribution.—Eastern Pacific off Lower California, 25°-31° N., and in the Gulf of California, two deep-abyssal records and two specimens in 1607 and 1180 meters.

Length.—?-241 mm.

Penopus macdonaldi Goode and Bean

Penopus macdonaldi Goode and Bean, 1895, Ocean. Ichth., p. 336, fig. 293
—Atlantic off coast of United States, ca. 38° N., 70° W.

Penopus macdonaldi Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2521.

Porogadus macdonaldi Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 404.

[*Porogadus*] *macdonaldi* Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal record and distribution.—Western Atlantic, 2982 meters, one specimen.

Length.—315 mm.

Penopus(?) microphthalmus Vaillant

Siremba microphthalmus Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 275, pl. 24, fig. 4—Atlantic off Cape Verde (see footnote, p. 110).

Dicromita microphthalmus Goode and Bean, 1895, Ocean. Ichth., p. 320; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1060, fig. 439.

Monomitopus microphthalmus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 407; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1329.

[*Porogadus*] *microphthalmus* Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 87.

Deep-abyssal record and distribution.—Eastern Atlantic, 3200 meters, three specimens.

Length.—?-142 mm.

Remarks.—*Siremba microphthalmus* Vaillant has been placed by later authors in the genera *Dicromita*, *Monomitopus*, and, tentatively, *Porogadus*. Norman (1939, p. 88) noted its resemblance to *Penopus macdonaldi*. The recent discovery in the Gulf of Mexico of a new species closely related to *S. microphthalmus* has shown that these two fishes cannot be assigned to any known brotulid

genus as currently understood. However, they are so similar to *Penopus* Goode and Bean, from which they seem to differ essentially only in scalation, that one is led to suspect a possible growth change in the form of the scales. The type and only specimen of *Penopus macdonaldi* was 315 mm. long, that of *S. microphthalmus* 142 mm. The latter, and the new form from the Gulf, which is 112 mm. long, have minute, round, embedded scales. These scales are not imbricated, but are close together; with growth they might overlap. The scales of *P. macdonaldi* are also very small but are apparently imbricated.

Mixonus laticeps Günther

Bathynectes laticeps Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 20—Atlantic, ca. 2° N., 20° W.

Mixonus laticeps Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 108, pl. 25, fig. B; Goode and Bean, 1895, Ocean. Ichth., p. 339, fig. 296, a; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2523; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 133; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1070, fig. 448; Beebe, 1937, Zoologica, 22: 206.

Siremo Guentheri Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., pp. 268, 386, pl. 24, fig. 5.

Deep-abyssal records and distribution.—Mid-Atlantic east of the mid-Atlantic ridge, 4571 meters, the type.

Eastern Atlantic off Cape Verde, 3200 meters, two specimens.

Eastern Atlantic, ca. 34° N., 33° W., 2615 meters, one specimen.

Length.—127–170 mm.

Remarks.—Beebe (1937, p. 206) listed from Bermuda a young specimen, 43 mm., taken in a pelagic net at a depth of 1280 meters.

Mixonus caudalis Garman

Mixonus caudalis Garman, 1899, Mem. Mus. Comp. Zool., 24: 148, pl. 36, fig. 2, pl. 39, fig. 2, pl. 74, fig. 2—Pacific off northern South America and Panama (type locality not designated).

Mixonus caudalis Trojan, 1906, op. cit., 30: 235, pls. 3, 4; Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 309; Trotter, 1926, Zoologica, 8: 113, fig. 30.

Deep-abyssal records.—Eastern Pacific, ca. 0° 36' S., 86° W., 2417 meters, (?) specimens.

Eastern Pacific, 3°–5° N., 82°–86° W., 2150, 2070, 1951 meters, an unstated number of specimens from three hauls.

North Indian Ocean, Gulf of Aden, 1840 meters, one specimen.

Distribution.—Eastern Pacific, ca. $0^{\circ} 36' S.$, $86^{\circ} W.$ and 3° – $5^{\circ} N.$, 82° – $86^{\circ} W.$, four deep-abyssal records and one specimen in 1524 meters. North Indian Ocean, one deep-abyssal record.

Length.—277–394 mm.

Mixonus pectoralis Goode and Bean

Bathyonus pectoralis Goode and Bean, 1885, Proc. U. S. Nat. Mus., 8: 604—Gulf of Mexico, ca. $28^{\circ} N.$, $87^{\circ} W.$

Nematonus pectoralis Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 114; Goode and Bean, 1895, Ocean. Ichth., p. 333, fig. 295; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2518.

Mixonus pectoralis Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 88.

Deep-abyssal record.—Western Atlantic, 2615 meters, the type.

Distribution.—Western Atlantic, one deep-abyssal record in the Gulf of Mexico and one young specimen off Dominica in 604 meters.

Length.—70, 215 mm.

Mastigopterus praetor Smith and Radcliffe

Mastigopterus praetor Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 160, pl. 12, fig. 2—Patiente Strait, Dutch East Indies.

Mastigopterus praetor de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 434, fig. 76.

Deep-abyssal record and distribution.—Western Pacific, ca. $0^{\circ} 28' S.$, $127^{\circ} E.$, 2361 meters, one specimen.

Length.—384 mm.

Grimaldichthys squamosus Roule

Grimaldichthys squamosus Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 19—Atlantic, ca. $36^{\circ} N.$, $22^{\circ} W.$

Grimaldichthys Roule, 1915, C. R. Acad. Sci. Paris, 161: 56.

Grimaldichthys squamosus Roule, 1919, Rés. Camp. Sci. Monaco, 52: 70, pl. 2, fig. 1; 1934, Poiss. Monde Viv. Eaux, 7: 189; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1066, fig. 445; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 15.

[*Mastigopterus*] *squamosus* Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 88.

Deep-abyssal record and distribution.—Eastern Atlantic, 4621 meters, one specimen.

Length.—286 mm.

Grimaldichthys profundissimus Roule

Grimaldichthys profundissimus Roule, 1913, Bull. Inst. Océanogr. Monaco, 261: 3, fig.—Atlantic, ca. 12° N., 33° W., 6035 meters.

Grimaldichthys profundissimus Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 19; 1919, Rés. Camp. Sci. Monaco, 52: 67, pl. 2, fig. 2; 1934, Poiss. Monde Viv. Eaux, 7: 187, pl. 11, text fig.; Richard, 1934, Rés. Camp. Sci. Monaco, 89: 298; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1066; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 15, pl. 1; Nybelin, 1951, Rep. Swedish Deep-sea Exp. 1947–1948, Zool., 2, (1), pp. 15, 21; 1953, 14 Intern. Congr. Zool. Copenhagen, p. 1.

[*Mastigopterus*] *profundissimus* Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 88.

Deep-abyssal records and distribution.—Mid-Atlantic east of the mid-Atlantic ridge, 6035 meters, the type.

Mid-Atlantic east of the mid-Atlantic ridge, ca. 9° N., 26° W., 5600–5610 meters, one specimen.

Western Atlantic, ca. 24° N., 63° W., 5850–5860 meters, one specimen.

Known so far only from the abyssal plain.

Length.—?–220 mm.

Remarks.—A brief discussion of the haul made in 6035 meters may be found in Richard (1902, p. 85). For many years this was the deepest known record for any fish.

Leucicorus lusciosus Garman

Leucicorus lusciosus Garman, 1899, Mem. Mus. Comp. Zool., 24: 146, 361, pl. 38, figs. 1–37, pl. 74, fig. 1—Pacific off Mexico, ca. 14° N., 98° W.

Leucicorus lusciosus Lendenfeld, 1905, op. cit., 30: 198, pl. 3, figs. 10–13; Trojan, 1906, op. cit., p. 221, pls. 1, 2.

Deep-abyssal record and distribution.—Eastern Pacific, 3436 meters, one specimen.

Length.—279 mm.

Enchelybrotula paucidens Smith and Radcliffe

Enchelybrotula paucidens Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 154, pl. 11, fig. 1—Gulf of Tomini, Celebes.

Enchelybrotula paucidens de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 437, fig. 78.

Deep-abyssal record and distribution.—Western Pacific, 1992 meters, one specimen.

Length.—547 mm.

Acanthonus armatus Günther

Acanthonus armatus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 22—type locality not stated, designated as *Challenger* Station 218, ca. 1° S., 144° E., 1956 meters, the locality of the specimen figured by Günther (1887).

Acanthonus armatus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 117, pl. 24, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 336; Alcock and McGilchrist, 1905, Ill. Zool. Investigator, Fishes, pl. 38, figs. 1 and 1, b; Koefoed, 1927, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (1), p. 140; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 409, fig. 64.

Deep-abyssal records and distribution.—Eastern Atlantic, ca. 27° N., 14° W., 2603 meters, one specimen.

Western Pacific north of New Guinea, 1956 meters, the type.

Western Pacific off the Philippines, ca. 16° N., 119° E., 1920 meters, one specimen.

Probably a deep-abyssal species.

Length.—292–350 mm.

Remarks.—I have been unable to find any data on the specimen figured (pl. 38) in *Illustrations of the Zoology of the Investigator, Fishes* (1905). (See p. 92 for a second eastern Atlantic specimen.)

Acanthonus spinifer Garman

Acanthonus spinifer Garman, 1899, Mem. Mus. Comp. Zool., 24: 170, pl. F, fig. 3—Pacific off Panama, ca. 4° N., 80° W.

Deep-abyssal record and distribution.—Eastern Pacific, 3240 meters, one specimen.

Length.—Ca. 76 mm.

Tauredophidium hexti Alcock

Tauredophidium Hextii Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 213, pl. 8, fig. 1—Bay of Bengal, ca. 18° N., 85° E.

Tauredophidium Hextii Alcock, 1891, op. cit., (6), 7: 11; 1899, Descr. Cat. Indian Deep-sea Fishes, p. 97; 1902, Nat. Indian Seas, p. 236, fig. 34; Goode and Bean, 1895, Ocean. Ichth., p. 337, fig. 296, b; Alcock and Anderson, 1898, Ill. Zool. Investigator, Fishes, pl. 21, fig. 3; Misra, 1950, Rec. Indian Mus., 45: 410; 1953, op. cit., 50: 392, fig. 11, a.

Deep-abyssal record and distribution.—North Indian Ocean, Bay of Bengal, 2395 meters, three specimens in one haul.

Length.—?–102 mm.

Typhlonus nasus Günther

Typhlonus nasus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 21—type locality not stated, designated as *Challenger* Station 181, ca. 13° S., 151° E., 4461 meters, the locality of the specimen figured in Günther (1887).

Typhlonus nasus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 119, pl. 25, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 340; de Beaufort and Chapman, 1951, Fishes Indo-Austr. Arch., 9: 408, fig. 63; Spärck, 1952, Danish Foreign Office Jour., 6: 6, fig.; Marshall, 1954, Aspects Deep Sea Biol., p. 249.

Deep-abyssal records and distribution.—Western Pacific northeast of Australia, 4461 meters, one specimen.

Western Pacific north of Celebes, ca. 2° N., 124° E., 3932 meters, one specimen.

Length.—?—254 mm.

Remarks.—The *Galathea* took five specimens in one haul near the Philippines, not far from the type locality (depth not stated; probably deep-abyssal).

Cataetyx simus Garman

Cataetyx simus Garman, 1899, Mem. Mus. Comp. Zool., 24: 168, 362, pl. E, fig. 2, pl. 39, figs. 3, 4, pl. 80, fig. 2—Pacific off Panama and between Ecuador and the Galapagos Islands (type locality not stated).

Deep-abyssal records and distribution.—Eastern Pacific, ca. 6° N., 83° W., 2690 meters, (?) specimens.

Eastern Pacific, 0° 36' S., ca. 86° W., 2417 meters, (?) specimens.

Eastern Pacific, ca. 7° N., 79° W., 2322 meters, (?) specimens.

Length.—?—483 mm.

Diplacanthopoma brunnea Smith and Radcliffe

Diplacanthopoma (Sarcocara) brunnea Smith and Radcliffe, in Radcliffe, 1913, Proc. U. S. Nat. Mus., 44: 167, pl. 13, fig. 3—Palawan Passage, Philippine Islands, 685 meters.

Diplacanthopoma brunnea Cockerell, 1916, Ann. Mag. Nat. Hist., (8), 18: 320; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 79.

Deep-abyssal record.—Arabian Sea, ca. 22° N., 64° E., 1893 meters, one specimen.

Distribution.—Western Pacific, the type in 685 meters. North Indian Ocean, one deep-abyssal specimen.

Length.—200–450 mm.

Aphyonus gelatinosus Günther

Aphyonus gelatinosus Günther, 1878, Ann. Mag. Nat. Hist., (5), 2: 22—Pacific south of New Guinea, ca. 12° S., 145° E.

Aphyonus gelatinosus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 120, pl. 26, fig. A; Goode and Bean, 1895, Ocean. Ichth., p. 342; Marshall, 1954, Aspects Deep Sea Biol., p. 249.

Deep-abyssal record and distribution.—Western Pacific, 2560 meters, one specimen.

Length.—140 mm.

Sciadonus pedicellaris Garman

Sciadonus pedicellaris Garman, 1899, Mem. Mus. Comp. Zool., 24: 172, pl. F, fig. 4—Pacific off Panama, ca. 5° N., 86° W.

Deep-abyssal record and distribution.—Eastern Pacific, 1847 meters, (?) specimens.

Length.—105 mm.

Barathronus affinis Brauer

Barathronus affinis Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 306—Indian Ocean, ca. 1° S., 73° E.

Barathronus affinis Brauer, 1908, op. cit., 15, (2), p. 162, pl. 35, figs. 11–13, text fig. 3.

Deep-abyssal record and distribution.—North Indian Ocean, 2919 meters, one specimen.

Length.—48 mm.

Barathronus parfaiti Vaillant

Alexterion parfaiti Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 283, pl. 25, fig. 2—Atlantic between France and the Azores, 5005 meters (see footnote, p. 110).

Alexterion parfaiti Goode and Bean, 1895, Ocean. Ichth., p. 343, fig. 300.

Barathronus parfaiti Roule, 1915, C. R. Acad. Sci. Paris, 161: 56; 1916, Bull. Inst. Océanogr. Monaco, 320: 18; 1919, Rés. Camp. Sci. Monaco, 52: 73, pl. 2, fig. 4; 1934, Poiss. Monde Viv. Eaux, 7: 194, pl. 11, text fig.; Legendre, 1934, Ann. Inst. Océanogr. Paris, 14: 406, fig. 52; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1071.

Deep-abyssal records.—Eastern Atlantic, 5005 meters, the type.

Eastern Atlantic near the Azores, ca. 39° N., 30° W., 1846 meters, one specimen.

Distribution.—Eastern Atlantic, two deep-abyssal records and one young specimen from the stomach of a tuna caught in the Gulf of Gascony.

Length.—33–117 mm.

Remarks.—The specimen (33 mm.) taken from a tuna's stomach shows that the young of this species are probably pelagic, thus raising considerable doubt that the type, which was only 42 mm. long, came from the bottom. However, the largest example was

taken in a bottom haul with typically benthic fishes. Nybelin (1953) considered the species to be pelagic.

Leucochlamys cryptophthalmus Zugmayer

Leucochlamys cryptophthalmus Zugmayer, 1911, Bull. Inst. Océanogr. Monaco, 193: 11—Atlantic, ca. 44° N., 10° W.

Leucochlamys cryptophthalmus Zugmayer, 1911, Rés. Camp. Sci. Monaco, 35: 131, pl. 6, fig. 4; Roule, 1934, Poiss. Monde Viv. Eaux, 7: 192–193, pl. 11, text fig.; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 15, pl. 3.

Deep-abyssal record and distribution.—Eastern Atlantic, 5000 meters, one specimen.

Length.—85 mm. (without caudal).

Remarks.—This specimen may have been caught in mid-water. The only other fish in the dredge was a *Gonostoma*.

Family SCORPAENIDAE

Apparently there are no scorpaenids known from deep-abyssal waters. A specimen of *Pontinus kuhlii* Bowdich was reported from a depth of 2330 meters by Vaillant (1888, p. 372) but the species is not included in the list of deep-abyssal fishes because it is an archibenthic fish not otherwise known to reach below 1098 meters.

Family COTTIDAE

Cottids are principally north Pacific fishes but are also represented in the north Atlantic and Arctic oceans, as well as in fresh water in the northern hemisphere. One species is found in the southern hemisphere. Deep-sea species are chiefly archibenthic.

Zesticelus profundorum Gilbert

Acanthocottus profundorum Gilbert, 1895, Rep. U. S. Comm. Fish, 1893: 423, pl. 27—Bering Sea, ca. 53° N., 167° W., 730 meters.

Zesticelus profundorum Jordan and Evermann, 1896, op. cit., 1895: 443; 1898, Bull. U. S. Nat. Mus., 47: 1990; 1900, op. cit., fig. 727; Jordan and Gilbert, 1899, Rep. Fur-seal Invest., 3: 467; Evermann and Goldsborough, 1907, Bull. U. S. Bur. Fish., 26: 315, fig. 75; Gilbert and Burke, 1912, op. cit., 30: 61; Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 342; Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 14; Andriashev, 1935, C. R. Acad. Sci. U.R.S.S., 4: 114; *1937, Inst. Hydr. Leningrad, Expl. mers U.R.S.S., 25; 1955, U. S. Fish Wildlife Serv., Spec. Sci. Rep. Fish., 145: 23, pl. 1, fig. 13; Bolin, 1944, Stanf. Ichth. Bull., 3, (1), p. 95, fig. 37.

Deep-abyssal record.—Eastern Pacific, Monterey Bay, 1980 meters, one specimen.

Distribution.—Northern and eastern Pacific from Kamchatka and Bering Sea to ca. 33° N., 120° W., one deep-abyssal specimen and eight in 730–1178 meters. Probably accidental in deep-abyssal waters.

Length.—32 (standard)—55 mm.

Family COTTUNCULIDAE

Only one cottunculid species has been found in the deep-abyssal zone. Others are known from shallower parts of the deep sea in the Arctic, both sides of the north Atlantic, off South Africa, and in the tropical western Pacific.

Cottunculoides spinosus Gilchrist

Cottunculus spinosus Gilchrist, 1906, Mar. Invest. So. Afr., 4: 149, pl. 38—off Cape Point, South Africa, 1463 meters.

Cottunculus spinosus Thompson, *1918, Mar. Biol. Rep. So. Afr., 4: 139; Gilchrist, 1922, Rep. Fish. Mar. Biol. Surv. So. Afr., 2, (3), p. 78.

Cottunculoides spinosus Barnard, 1927, Ann. Mag. Nat. Hist., (9), 20: 76; 1927, Ann. So. Afr. Mus., 21: 924; Smith, 1949, Sea Fishes So. Afr., p. 376, fig. 1056.

Deep-abyssal record.—Off South Africa, ca. 33° S., 17° E., 2176 meters, one specimen.

Distribution.—Off Cape Point, South Africa, one deep-abyssal specimen and one in 1463 meters.

Length.—45–78 mm.

Family LIPARIDAE

A large family composed chiefly of benthic fishes, liparids are found principally but not exclusively in northern seas, ranging from tide pools to deep-abyssal waters. A few deep-sea species have taken to life in mid-water. Like the Cottidae, it is in cold and temperate north Pacific waters that the family has its largest population, although it is also well represented in the north Atlantic. A number of species are found in the Antarctic, several in temperate South Africa, seven in deep water in the tropical eastern Pacific, and one deep-sea species in the tropical Indian Ocean.

Thirteen species, belonging to four genera, are recorded from deep-abyssal waters but there is no positive indication that they

are more than accidental there. On the other hand there is no proof that liparids known from only one or two specimens are not normal inhabitants of the deep-abyssal zone. Their absence in shallower hauls has some significance. All but three of the species under consideration here are from the northern and tropical eastern Pacific, and of these three, *Paraliparis copei* scarcely deserves a place on the list. Some may prove to be pelagic forms.

The only liparids known from the abyssal plain below 3660 meters are two unnamed forms, one of them from the north Pacific at a depth of 7200 meters, the other from the south Pacific in 6660 meters (see pp. 81-82).

Rhodichthys regina Collett. Table 24.

Rhodichthys regina Collett, *1878, Vidensk. Selsk. Forh., 1878, (14), p. 99—Arctic, ca. 72° N., 5° E., 2431 meters.

Rhodichthys regina Collett, 1880, Norske Nordhavs Exp. 1876-78, Zool., Fiske, p. 154, pl. 5, figs. 37-39; 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 143, pl. 2, fig. 10; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 121; Lilljeborg, *1891, Sveriges Norges Fauna, Fisk., 2: 238; Goode and Bean, 1895, Ocean. Ichth., p. 342, fig. 303; Smitt, 1895, Skand. Fiskar, p. 596, fig. 142; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 31, pl. 3, fig. 4; Lönnberg, 1900, Rev. Intern. Pêche Pisc., 2, (4), p. 13; Ehrenbaum, 1902, Fauna Arct., 2: 118; Jensen, *1905, Medd. Komm. Havunders., Ser. Fisk., 1, (7); 1950, Vidensk. Medd. Dansk naturh. Foren., 112: 243, figs. 2, 3; Regan, 1912, Ann. Mag. Nat. Hist., (8), 10: 277; Murray and Hjort, 1912, Depths of Ocean, p. 436; Johnsen, 1921, Bergens Mus. Aarb., 1918-19, (6), pp. 24, 73, figs. 5-8; Essipov, 1937, Prob. Arctic, Arctic Inst. U.S.S.R., 4: 88, 94; 1939, Zool. Zhur., 18, (5), pp. 882, 887; Berg, 1940, Trav. Inst. Zool. Acad. Sci. U.R.S.S., 5: 331, 490; Andriashev, 1954, Fauna S.S.S.R., 53: 467, 542, figs. 272-274.

Deep-abyssal records.—Arctic, Kara Sea, ca. 82° N., 87° E., 2365 meters, one specimen.

Arctic, ca. 72° N., 5° E., 2341 meters, one specimen.

Arctic, 67°-69° N., 8°-10° and 61° W., 1835-2000 meters, at least five specimens, perhaps more, from five hauls.

Distribution.—Arctic only, in the west from Baffin Bay and Davis Strait (ca. 74° N., 70° W. to ca. 67° N., 60° W.) and in the east from the Laptev Sea (ca. 77° N., 117° E.) and north of Novaya Zemlya (ca. 82° N., 87° E.) to ca. 63° N., 6° W.; seven deep-abyssal records and at least twenty-seven specimens from between 1150-1320 and 1783 meters. Perhaps partially deep-abyssal in habitat but with its center of distribution somewhat higher.

Length.—38-297 mm.

Remarks.—Johnsen (1921, p. 73) wrote that the species might be pelagic, although it has been taken only in bottom-fishing appliances. It is apparently confined to waters of below-freezing temperatures.

Careproctus bathycoetus Gilbert and Burke

Careproctus bathycoetus Gilbert and Burke, 1912, Proc. U. S. Nat. Mus., 42: 368, pl. 45, fig. 10—Okhotsk Sea, ca. 46° N., 145° E.

Careproctus bathycoetus Burke, 1930, Bull. U. S. Nat. Mus., 150: 129, fig. 50; Soldatov and Lindberg, *1930, Bull. Pac. Sci. Inst. Fish. Oceanogr., 5: 392; Schmidt, 1950, Akad. Sci. U.S.S.R. Trans. Pac. Comm., 6: 208.

Deep-abyssal record and distribution.—Northwestern Pacific, 3291 meters, one specimen.

Length.—181 mm.

Careproctus longifilis Garman

Careproctus longifilis Garman, 1892, Mem. Mus. Comp. Zool., 14: 9—Pacific off Ecuador, ca. 2° N., 83° W.

Careproctus longifilis Garman, 1899, op. cit., 24: 114, pl. 27, fig. 1, pl. 28, fig. 1, pl. 29, fig. 5; Burke, 1930, Bull. U. S. Nat. Mus., 150: 130, fig. 1.

Deep-abyssal record and distribution.—Eastern Pacific, 3333 meters, one specimen.

Length.—95 mm.

Careproctus ovigerum Gilbert

Bathyphasma ovigerum Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 448—Pacific off the Queen Charlotte Islands, ca. 52° N., 132° W.

Bathyphasma ovigerum Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2128; 1900, op. cit., fig. 767.

Careproctus ovigerum Burke, 1930, op. cit., 150: 131, fig. 52; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 302, fig. 224.

Deep-abyssal record and distribution.—Eastern Pacific, 2904 meters, one specimen.

Length.—315 mm.

Careproctus opisthotremus Gilbert and Burke

Careproctus opisthotremus Gilbert and Burke, 1912, Bull. U. S. Bur. Fish., 30: 78, fig. 23—Bering Sea, ca. 52° N., 174° E.

Careproctus opisthotremus Burke, 1930, Bull. U. S. Nat. Mus., 150: 133, fig. 53.

Deep-abyssal record and distribution.—North Pacific, 1914 meters, one specimen.

Length.—50 mm.

Paraliparis fimbriatus Garman

Paraliparis fimbriatus Garman, 1892, Mem. Mus. Comp. Zool., 14: 9—Pacific off Colombia, ca. 4° N., 80° W.

Paraliparis fimbriatus Garman, 1899, op. cit., 24: 116, pl. D, fig. 3, pl. 29, fig. 1; Burke, 1930, Bull. U. S. Nat. Mus., 150: 167, fig. 84.

Deep-abyssal record and distribution.—Eastern Pacific, 3240 meters, (?) specimens.

Length.—102 mm.

Paraliparis ulochir Gilbert

Paraliparis ulochir Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 441—Gulf of California, ca. 27° N., 111° W.

Paraliparis ulochir Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2144; Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 354; Burke, 1930, Bull. U. S. Nat. Mus., 150: 171, fig. 89; Böhlke, 1953, Stanf. Ichth. Bull., 5: 138.

Deep-abyssal record.—Eastern Pacific, 1838 meters, the types (number of specimens not stated).

Distribution.—Eastern and northern Pacific, one deep-abyssal record in the Gulf of California, two specimens from Monterey Bay in 1383–1592 meters and one from Bering Sea (ca. 54° N., 166° W.) in 743 meters.

Length.—?–85 mm.

Paraliparis bathybi Collett

Liparis (Paraliparis) bathybi Collett, *1879, Vidensk. Selsk. Forh., 1878: 32—Arctic, ca. 74° N., 14° E., 1203 meters.

Paraliparis bathybi (bathybius of authors) Collett, 1880, Norske Nordhavs Exp. 1876–78, Zool., Fiske, p. 52, pl. 2, fig. 14; 1905, Rep. Norwegian Fish. Mar. Invest., 2, (3), p. 104, pl. 2, fig. 9; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 68, pl. 12, fig. C; Garman, 1892, Mem. Mus. Comp. Zool., 14: 81; Goode and Bean, 1895, Ocean. Ichth., p. 279; Lütken, 1898, Danish Ingolf Exp., 2, (1), p. 17; Lönnberg, 1900, Rev. Intern. Pêche Pisc., 2, (4), p. 13; Ehrenbaum, 1902, Fauna Arct., 2: 101; Jensen, *1905, Medd. Komm. Havunders., Ser. Fisk., 1, (7); 1950, Vidensk. Medd. Dansk naturh. Foren., 112: 243, figs. 1, 3; Murray and Hjort, 1912, Depths of Ocean, pp. 126–127, 436–437, 641, 688, fig. 107; Johnsen, 1921, Bergens Mus. Aarb., 1918–19, (6), pp. 17, 70, pl., fig. 1, text figs. 2–4; Burke, 1930, Bull. U. S. Nat. Mus., 150: 172; Andriashev, 1954, Fauna S.S.S.R., 53: 465, 542, figs. 271, 272.

Deep-abyssal records.—Arctic between Jan Mayen and Greenland, 2000 meters, one specimen.

Arctic, ca. 67° N., 10° W., 1847 meters, one specimen.

Arctic, ca. 69° N., 8° W., 1835 meters, six specimens.

Distribution.—Arctic only, in Davis Strait (ca. 67° N., 60° W.) and from ca. 74° N., 14° E. and 69° N., 8° W. to the Faroe Channel, three deep-abyssal records and forty-nine specimens in 670–1783 meters. Only two examples known from above 1200 meters. Probably reaching the deep-abyssal zone only occasionally.

Length.—179–253 mm.

Remarks.—There is some doubt concerning the habitat of the species, as it has been taken twice in mid-water. One of these pelagic specimens, a female containing large eggs, came aboard alive from a depth of only 670 meters (Johnsen, 1921, p. 70). On the other hand thirty-four specimens were taken in one trawl haul made at a depth of 1783 meters and there have been other catches of two to seven specimens each in bottom-fishing appliances. Johnsen (op. cit., p. 69) suggested that *P. bathybi* may be a pelagic species that seeks bottom for spawning purposes, or an entirely pelagic species that gathers in shoals at spawning time.

Paraliparis latifrons Garman

Paraliparis latifrons Garman, 1899, Mem. Mus. Comp. Zool., 24: 120, pl. 27, fig. 2, pl. 28, fig. 2—Pacific off Panama, ca. 6° N., 80° W.

Paraliparis latifrons Burke, 1930, Bull. U. S. Nat. Mus., 150: 174, fig. 91.

Deep-abyssal record and distribution.—Eastern Pacific, 3279 meters, seven specimens in one haul.

Length.—?–145 mm.

Paraliparis holomelas Gilbert

Paraliparis holomelas Gilbert, 1896, Rep. U. S. Comm. Fish, 1893: 441—Bering Sea, ca. 54° N., 166° W., 743 meters.

Paraliparis holomelas Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2140; Johnsen, 1921, Bergens Mus. Aarb., 1918–19, (6), pp. 20, 71, fig. 1; Burke, 1930, Bull. U. S. Nat. Mus., 150: 175, fig. 92; Schmidt, 1950, Akad. Sci. U.S.S.R. Trans. Pac. Comm., 6: 222; Böhlke, 1953, Stanf. Ichth. Bull., 5: 138.

Deep-abyssal records.—Northern Okhotsk Sea off Cape Elizabeth, 3350 meters, one specimen.

Bering Sea, ca. 56° N., 172° W., 2971 meters, one specimen.

Distribution.—North Pacific in the Okhotsk and Bering Seas, two deep-abyssal specimens and two in 743 and 128 meters.

Length.—53–100 mm.

Remarks.—Specimens reported from Alaska by Evermann and Goldsborough (1907, p. 334) belong to *P. deani* Burke (1930, p. 168).

Paraliparis copei Goode and Bean

Paraliparis copei Goode and Bean, 1895, Ocean. Ichth., p. 279, fig. 253—Atlantic off coast of United States, ca. 39° N., 72° W., 951 meters.

Paraliparis copei Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2143; Roule, 1919, Rés. Camp. Sci. Monaco, 52: 62; Barnard, 1927, Ann. So. Afr. Mus., 21: 926; Burke, 1930, Bull. U. S. Nat. Mus., 150: 181, fig. 99; Smith, 1949, Sea Fishes So. Afr., p. 380, fig. 1073.

Deep-abyssal record.—Off Cape Point, South Africa, 1829 meters, one specimen.

Distribution.—Western Atlantic, ca. 39° N., 70°–74° W., ten specimens, 548–1086 meters. Northwestern Atlantic, Davis Strait, ca. 63° N., 55° W., one specimen in 1200 meters. Eastern Atlantic, ca. 38° N., 28° W., three specimens in 1692 meters. South Africa off Cape Point, one deep-abyssal specimen and one in 1645 meters. Probably accidental in deep-abyssal waters.

Length.—120–225 mm.

Paraliparis grandiceps Garman

Paraliparis grandiceps Garman, 1899, Mem. Mus. Comp. Zool., 24: 117, pl. 29, fig. 4—Gulf of California, ca. 25° N., 109° W.

Paraliparis grandiceps Burke, 1930, Bull. U. S. Nat. Mus., 150: 183, fig. 101.

Deep-abyssal record and distribution.—Eastern Pacific, 2904 meters, one specimen.

Length.—254 mm.

Acantholiparis opercularis Gilbert and Burke

Acantholiparis opercularis Gilbert and Burke, 1912, Bull. U. S. Bur. Fish., 30: 83, fig. 28—Pacific off Kamchatka, ca. 52° N., 158° E., 1248 meters.

Acantholiparis opercularis Burke, 1930, Bull. U. S. Nat. Mus., 150: 188, figs. 104, 105; Böhlke, 1953, Stanf. Ichth. Bull., 5: 135.

Deep-abyssal record.—North Pacific, ca. 53° N., 159° W., 3608 meters, one specimen.

Distribution.—North Pacific, one deep-abyssal record and two specimens off Kamchatka in 1248 meters.

Length.—?–76 mm.

Family TRIACANTHODIDAE

Atrophacanthus danae Fraser-Brunner

Atrophacanthus danae Fraser-Brunner, 1950, Dana Rep., 35: 3, figs. 1–5—Celebes Sea.

Distribution.—Western Pacific, Celebes Sea only, 156 specimens in 2500–3500 meters (4000–5000 meters of wire) and twenty-eight specimens in 300–2000 meters (600–3000 meters of wire), all over bottom depths ranging between 2160 and 4950 meters.

This is a bathypelagic species which, according to Fraser-Brunner (1950, p. 7) lives and breeds over considerable depths and was absent from *Dana* hauls made over shallower water in the Celebes Sea.

Length.—2–44 mm. (standard).

Remarks.—Other members of the family live in shallower water and all may not be bathypelagic.

Family CHAUNACIDAE

Of the eight species of this small deep-sea family, only one has been reported from deep-abyssal waters. Barnard (1927, p. 1003) and other authors believe that the various species of the single genus *Chaunax* are synonymous. The fishes are found chiefly in tropical latitudes but also extend into temperate waters in the eastern Atlantic and off Australia.

Chaunax roseus Barbour

Chaunax roseus Barbour, 1941, Proc. New England Zool. Club, 19: 8, pl. 2
—off Cuba.

Deep-abyssal record and distribution.—Western Atlantic, 1956 meters, one specimen.

Length.—Ca. 219 mm.

Family OGOCEPHALIDAE

Six ogocephalids, only one of them known from more than a few specimens, have been taken from the deep-abyssal zone. Other members of the family are known from both deep and shallow water in almost all tropical and temperate seas.

Malthopsis spinosa Garman

Malthopsis spinosa Garman, 1899, Mem. Mus. Comp. Zool., 24: 104, pl. 22
—Pacific off Panama, ca. 7° N., 79° W.

Deep-abyssal records and distribution.—Eastern Pacific, 2322, 1865 meters, an unstated number of specimens from two hauls.

Length.—Not stated.

Halieutopsis tumifrons Garman

Halieutopsis tumifrons Garman, 1899, Mem. Mus. Comp. Zool., 24: 90, pl. 25
—Pacific near the Galapagos Islands.

Deep-abyssal records and distribution.—Eastern Pacific, ca. 2° N., 92° W., 2488 meters, (?) specimens.

Eastern Pacific, ca. 0° 36' S., 86° W., 2417 meters, (?) specimens.

Length.—Not stated.

Dibranchus nasutus Alcock

Dibranchus nasutus Alcock, 1891, Ann. Mag. Nat. Hist., (6), 8: 24, pl. 7,
fig. 1.—Bay of Bengal, ca. 11° N., 92° E., 343–403 meters.

Dibranchus nasutus Alcock and Anderson, 1898, Ill. Zool. Investigator,
Fishes, pl. 20, fig. 2; Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes,
p. 63; 1902, Nat. Indian Seas, p. 247, fig. 46; Brauer, 1906, Wiss. Ergebn.
Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 328; Radcliffe, 1912, Proc.
U. S. Nat. Mus., 42: 211, pl. 22, fig. 3, pl. 23, fig. 3; Weber, 1913, Monogr.
Siboga Exp., 57: 568, pl. 9, figs. 1, 2; Norman, 1939, Sci. Rep. John
Murray Exp. 1933–34, 7, (1), p. 113.

Deep-abyssal record.—Western Pacific, Banda Sea, 1886 meters,
one specimen.

Distribution.—Western Pacific in Macassar Strait, Banda Sea
and Timor Sea, one deep-abyssal record and three specimens in
724–1158 meters. North Indian Ocean from ca. 1° S., 41° E.
and the Gulf of Aden to the Andaman Sea, at least five specimens,
three records in 343–743 meters, one in 1270 meters and one in 1668
meters. Probably accidental in deep-abyssal waters.

Length.—33–140 mm.

Dibranchus nudiventer Lloyd

Dibranchus nudiventer Lloyd, 1909, Mem. Indian Mus., 2: 168, pl. 45, fig. 2
—Bay of Bengal off Arakan, 2012 meters.

Dibranchus nudiventer Norman, 1939, Sci. Rep. John Murray Exp. 1933–34,
7, (1), p. 113.

Deep-abyssal record.—North Indian Ocean, Bay of Bengal, 2012
meters, one specimen.

Distribution.—North Indian Ocean, one deep-abyssal record and
one specimen near Zanzibar in 1789 meters.

Length.—65–75 mm.

Dibranchus hystrix Garman

Dibranchus hystrix Garman, 1899, Mem. Mus. Comp. Zool., 24: 92, pl. 23
—Pacific off Colombia and Panama (type locality not stated).

Dibranchus hystrix Townsend and Nichols, 1925, Bull. Amer. Mus. Nat. Hist., 52: 18.

Deep-abyssal records.—Eastern Pacific, ca. 7° N., 79° W., 2322 meters, (?) specimens.

Eastern Pacific, ca. 2° N., 89° W., 2196 meters, (?) specimens.

Eastern Pacific, ca. 5° N., 85° W., 2150 meters, (?) specimens.

Distribution.—Eastern Pacific, three deep-abyssal records, 2°–7° N., 79°–89° W.; and one specimen off Mexico, ca. 22° N., 109° W., 1153 meters.

Length.—Not stated.

Remarks.—The eastern Atlantic specimen reported by Murray and Hjort (1912, p. 411) was later identified as *D. atlanticus* by Koefoed (1927, p. 141).

Dibranchus obscurus Brauer

Dibranchus obscurus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 330—Gulf of Aden, 1840 meters.

Dibranchus obscurus Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 113, fig. 39.

Deep-abyssal record.—North Indian Ocean, Gulf of Aden, 1840 meters, one specimen.

Distribution.—North Indian Ocean in the Gulf of Aden and near Zanzibar, one deep-abyssal specimen and three in 1022–1789 meters.

Length.—42–210 mm.

CERATIOIDEA

Recent studies by Bertelsen (1951) have shown that the distribution of adult ceratioid fishes is nearly cosmopolitan, including temperate and cold waters in the north Atlantic, north Pacific, and southern oceans, but that larval stages have been found only in the warmer areas, between about 40° N. and 35° S.

All members of the order, which contains ten families, are apparently bathypelagic, the metamorphosing and adult specimens being found principally at or below a depth of about 2000 meters, according to Bertelsen. Larvae occur in much shallower water, above 200 meters, and adolescent females in 1500–2000 meters. Few species are represented in collections in enough quantity to permit an estimate of their maximum occurrence. Bertelsen found that *Cryptopsaras couesi* Gill (family Ceratiidae) apparently in-

habits lesser depths than most species, while *Melanocetus murrayi* Günther (family Melanocetidae) lives somewhat deeper. *Edriolychnus schmidti* Regan (family Linophrynidae) probably inhabits deep-abyssal waters.

In view of the complexities of the vertical distribution of this group of fishes, metamorphosing, adolescent and adult specimens of all known species are listed. It is quite possible that some live in deep-abyssal waters as adolescents and adults. The presence well above the 2000-meter line of mature females of various species suggests that occurrence below that depth may in some cases be confined to males and unmated adult females (see *Linophryne arborifera*, p. 273).

Parasitic males have been discovered in four families: Caulophrynidae, Ceratiidae, Neoceratiidae and Linophrynidae. Judging from evidence that free-living males of the Himantolophidae and Melanocetidae grow and feed after metamorphosis and that those of the families Oneirodidae and Gigantactinidae have large testicles, Bertelsen has concluded that males of these four families probably never become parasitic, only attaching temporarily by means of their rostral denticles. Too little is known of males of the families Diceratiidae and Centrophrynidae to speculate upon their life histories.

For *Dana* records the depth of capture in relation to meters of wire has been taken from Bertin (1934, p. 29), as follows:

Meters of Wire	Depth, meters
1000-2000	800-1500
3000-4000	2000-2500
5000-6000	3500-4000

Family CAULOPHRYNIDAE

Bertelsen (1951) limited the family to one species with three subspecies, adult and adolescent specimens of which are listed below. Larvae have been taken in the Indian Ocean, Tasman Sea, western Pacific and eastern Atlantic. Nine adult or adolescent specimens have been recorded, five of them from deep-abyssal waters. Males are known to be parasitic.

Caulophryne jordani jordani Goode and Bean

Caulophryne jordani Goode and Bean, 1895, Ocean. Ichth., p. 496, fig. 409
—Atlantic off coast of United States, ca. 39° N., 71° W., 2334 meters.

Caulophryne jordani Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2735; 1900, op. cit., fig. 957; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 585, fig. 24; Regan, 1912, Ann. Mag. Nat. Hist., (8), 9: 288; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 22 (part), fig. 16; Beebe, 1926, Arcturus Adv., p. 422; 1929, Zoologica, 12: 19; Regan and Trewavas, 1932, Dana Rep., 2: 101, fig. 159; Bertelsen, 1951, op. cit., 39: 33, fig. 8.

Caulophryne Beebe and Rose, 1926, Bull. N. Y. Zool. Soc., 29: 53, fig.

Deep-abyssal record.—Western Atlantic, 2334 meters, one specimen.

Distribution.—Western Atlantic off New York, off New Jersey, and near Bermuda, one deep-abyssal record and two specimens in 1098 and 549-914 meters.

Length.—?—40 mm.

***Caulophryne jordani pelagica* Brauer**

Melanocetus pelagicus Brauer, 1902, Zool. Anz., 25: 295—Indian Ocean west of Chagos Archipelago, ca. 2° S., 65° E., 2500 meters.

Melanocetus pelagicus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 321, pl. 15, fig. 5.

Caulophryne pelagicus Regan, 1912, Ann. Mag. Nat. Hist., (8), 9: 288.

Caulophryne jordani Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 22 (part).

Caulophryne pelagica Regan and Trewavas, 1932, Dana Rep., 2: 102, fig. 162.

Caulophryne ramulosa Regan and Trewavas, 1932, op. cit., p. 101, pl. 7, text fig. 160.

Caulophryne acinosa Regan and Trewavas, 1932, op. cit., p. 101, pl. 8, fig. 1, text fig. 61.

Caulophryne jordani pelagica Bertelsen, 1951, op. cit., 39: 33, 37, figs. 9, 10, 11, c.

Deep-abyssal records and distribution.—North Indian Ocean, ca. 1°-2° S., 65° E., 2500, 2200 meters, two specimens.

Western Pacific, ca. 15° N., 115° E. (South China Sea), 2000 meters, one metamorphosing male, the only known free-living male specimen of the family.

Eastern Pacific, Gulf of Panama, 2000 meters, one specimen.

Length.—11-90 mm.

***Caulophryne jordani polynema* Regan**

Caulophryne polynema Regan, 1930, Jour. Linn. Soc. London, 37: 191, figs. 1-3—Madeira.

Caulophryne polynema Parr, 1930, Copeia, p. 131, fig. 4; Regan and Trewavas, 1932, Dana Rep., 2: 14, 101, fig. 2; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1347.

Ceratocaulophryne regani Roule and Angel, 1932, Bull. Mus. Hist. Nat. Paris, 4: 500; 1933, Rés. Camp. Sci. Monaco, 86: 55, pl. 3, figs. 26, 26, a; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 17.

Caulophryne regani Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1347.

Caulophryne jordani polymema Bertelsen, 1951, Dana Rep., 39: 33.

Deep-abyssal record.—Mid-Atlantic, ca. 38° N., 34° W., 3000 meters, one specimen.

Distribution.—Atlantic, one deep-abyssal record and one female specimen with a parasitic male taken on a line in deep water off Madeira (eastern Atlantic).

Length.—59–210 mm.

Family MELANOCETIDAE

According to the latest revision the family contains only the genus *Melanocetus* Günther, with nine species, although Bertelsen (1951) explained that the separation of the species is still uncertain.

Melanocetus murrayi Günther. Table 25.

Melanocetus murrayi Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 57, pl. 11, fig. A—mid-Atlantic, ca. 1° N., 24° W., 3384 meters.

Melanocetus bispinosus Günther, 1880, Intr. Study Fishes, p. 473 (name only).

Melanocetus (Liocetus) murrayi Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 56.

Liocetus murrayi Goode and Bean, 1895, Ocean. Ichth., p. 495, fig. 407; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 583, fig. 22.

Melanocetus vorax Brauer, 1902, Zool. Anz., 25: 294; 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 320, pl. 15, fig. 4; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1144.

Melanocetus johnsoni Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 319, pl. 15, fig. 3; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 33 (part); Murray and Hjort, 1912, Depths of Ocean, pp. 609, 614, 618, fig. 469.

Melanocetus krechii Murray and Hjort, 1912, Depths of Ocean, pp. 614 (part), 618.

Melanocetus murrayi Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 32; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 27; 1934, op. cit., 4, (6), p. 7; Regan and Trewavas, 1932, Dana Rep., 2: 49, fig. 71; Beebe, 1932, Zoologica, 13: 99, figs. 29, 30; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 3; Bertelsen, 1951, Dana Rep., 39: 44, fig. 16; Grey, 1955, Fieldiana, Zool., 37: 299.

Melanocetus niger Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 29; Beebe, 1929, Zoologica, 12: 18; ? Gregory, 1933, Trans. Amer. Phil. Soc., 23: 400, fig. 272.

SYNONYMY OF MALES

Rhynchoceratias acanthiostriis Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 31, fig. 11.

Rhynchoceratias latirhinus Parr, 1927, op. cit., p. 32, fig. 12.

Rhynchoceratias longipinnis Parr, 1930, Occ. Pap. Bingham Oceanogr. Coll., 3: 7, figs. 1-7.

Xenoceratias acanthiostriis Regan and Trewavas, 1932, Dana Rep., 2: 55.

Xenoceratias longipinnis Regan and Trewavas, 1932, op. cit., p. 56.

Xenoceratias latirhinus Regan and Trewavas, 1932, op. cit., p. 57.

? *Xenoceratias regani* Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 4, pl. 1, fig. 6.

Distribution.—Eastern and mid-Atlantic from ca. 34° N., 33° W. to the Gulf of Guinea. Western Atlantic off New York to Bermuda, in the Gulf of Mexico and in the Caribbean Sea. Pacific in ca. 4° S., 116° W.; in the Banda Sea; and off Sydney, Australia, ca. 33° S., 154° E. More than fifty specimens known, about half of them deep-abyssal. Extreme depth range 1050-4480 meters.

Larvae have been found on both sides of the north Atlantic, in the south Atlantic, the south Pacific and the western Pacific.

Length.—15-115 mm. (without caudal).

Melanocetus megalodontis Beebe and Crane

Melanocetus megalodontis Beebe and Crane, 1947, Zoologica, 31: 152, fig. 1—Pacific, ca. 20° N., 115° W.

Melanocetus megalodontis Bertelsen, 1951, Dana Rep., 39: 48.

Distribution.—Eastern Pacific, 914 meters, one specimen.

Length.—38.5 mm.

Melanocetus johnsoni Günther. Table 26.

Melanocetus johnsoni Günther, 1864, Proc. Zool. Soc. London, p. 301, pl. 25—Madeira.

Melanocetus johnsoni Lütken, *1871, Dansk Vidensk. Selsk. Skr., (5), 11, (5), pp. 64, 74; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 56; Vaillant, 1888, Exp. Sci. Trav. Talis., Poiss., p. 346; Goode and Bean, 1895, Ocean. Ichth., p. 494, fig. 406; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 582, fig. 20; Regan, 1913, Proc. Zool. Soc. London, p. 1096; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 33; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 29; Norman, 1930, Disc. Rep., 2: 354; 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 114; Regan and Trewavas, 1932, Dana Rep., 2: 12, 49, 50, figs. 72, 73; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1143, fig. 482; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 3; Beebe and Crane, 1947,

- Zoologica, 31: 152; Bertelsen, 1951, Dana Rep., 39: 39, 48, figs. 13, 15, 17-19.
- ?*Melanocetus krechi* Brauer, 1902, Zool. Anz., 25: 293; 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 319, pl. 15, figs. 1, 2; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 583, fig. 21; Murray and Hjort, 1912, Depths of Ocean, pp. 87, 614 (part); Borodin, 1931, Bull. Mus. Comp. Zool., 72: 84; Regan and Trewavas, 1932, Dana Rep., 2: 52, fig. 74.
- ?*Melanocetus rotundatus* Gilchrist, 1903, Mar. Invest. So. Afr., 2: 206, pl. 15; Gilchrist and Thompson, *1917, Ann. Durban Mus., 1: 417; Thompson, *1918, Mar. Biol. Rep. So. Afr., 4: 155; Barnard, 1927, Ann. So. Afr. Mus., 21: 1007; Von Bonde, 1928, Rep. Fish. Mar. Biol. Surv. So. Afr., 5: 49; Smith, 1949, Sea Fishes So. Afr., p. 429, fig. 1232.
- Melanocetus* sp. Roule and Angel, 1930, Rés. Camp. Sci. Monaco, 79: 121, pl. 6, fig. 159.
- Melanocetus cirrifer* Regan and Trewavas, 1932, Dana Rep., 2: 52 (part).

SYNONYMY OF MALES

- Centroctetus spinulosus* Regan and Trewavas, 1932, Dana Rep., 2: 53, fig. 79.
- Xenoceratias micracanthus* Regan and Trewavas, 1932, op. cit., p. 55, fig. 81.
- Xenoceratias heterorhynchus* Regan and Trewavas, 1932, op. cit., p. 56, fig. 82.
- Xenoceratias laevis* Regan and Trewavas, 1932, op. cit., p. 56, fig. 83.
- Xenoceratias brevirostris* Regan and Trewavas, 1932, op. cit., p. 57, fig. 84.
- ?*Xenoceratias braueri* Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 6, fig. 2.

Distribution.—Atlantic from ca. 41° to 8° N. and, in the east, south to ca. 35° S., 18° E. North Indian Ocean from off the Cocos-Keeling Islands and the Arabian Sea to off Durban, ca. 31° S., 30° E. Western Pacific in the South China Sea and Celebes Sea. South Pacific off New Caledonia, between New Zealand and the Kermadec Islands, and in ca. 4° S., 116° W. Gulf of Panama. Extreme depth range 0-4789 meters.

Larvae have been taken in the western, eastern and south-eastern Atlantic, the Indian Ocean off South Africa, the north Indian Ocean and the western and southwestern Pacific.

About four hundred specimens are known in all, only eighty or so being adults, adolescents or metamorphosing examples. About half of these older specimens were caught at or below 2000 meters.

Length.—7-114 mm.

Remarks.—Four specimens found floating at the surface and three whose depth of capture is unknown have been omitted from Table 26.

Melanocetus niger Regan

Melanocetus niger Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Gulf of Panama, 2200 meters.

Melanocetus niger Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 33, pl. 8, fig. 1; Regan and Trewavas, 1932, Dana Rep., 2: 53, fig. 76, b; Beebe and Crane, 1947, Zoologica, 31: 153; Bertelsen, 1951, Dana Rep., 39: 53.

Deep-abyssal records.—Gulf of Panama, 2000–2300 meters, eight specimens from five hauls.

Distribution.—Eastern Pacific in the Gulf of Panama and south of Cocos Island, fifteen specimens, eight of them deep-abyssal, seven in 500–1700 meters.

Length.—18–113 mm.

Remarks.—Males and larvae unknown.

Melanocetus ferox Regan

Melanocetus ferox Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 33, pl. 9, fig. 1—Gulf of Panama, 2000 meters.

Melanocetus ferox Regan and Trewavas, 1932, Dana Rep., 2: 52, fig. 75; Beebe and Crane, 1947, Zoologica, 31: 152; Bertelsen, 1951, Dana Rep., 39: 53.

Deep-abyssal records.—Gulf of Panama, 2500, 2000 meters, three specimens from three hauls.

Distribution.—Eastern Pacific off the Galapagos Islands, off Costa Rica, and in the Gulf of Panama. Five specimens known, three deep-abyssal, one in 914 meters and one in 549 meters.

Length.—23.5–110 mm.

Remarks.—The species is probably a variation of *M. niger* (Bertelsen, 1951, p. 53). Males and larvae unknown.

Melanocetus cirrifer Regan and Trewavas

Melanocetus cirrifer Regan and Trewavas, 1932, Dana Rep., 2: 52, pl. 2, fig. 1, text figs. 76, a, 77—Banda Sea.

Melanocetus cirrifer Bertelsen, 1951, op. cit., 39: 53.

Deep-abyssal records and distribution.—Western Pacific, Banda Sea, 2500 meters, the type.

Western Pacific, Celebes Sea, 2000 meters, one specimen.

Length.—24–39 mm.

Remarks.—Bertelsen (1951, p. 53) doubted the validity of this species. Males and larvae unknown.

Melanocetus longirostris Regan and Trewavas

Xenoceratias longirostris Regan and Trewavas, 1932, Dana Rep., 2: 54, fig. 80
—north of New Guinea, ca. 3° N., 137° E.

Melanocetus longirostris Bertelsen, 1951, op. cit., 39: 54.

Deep-abyssal record and distribution.—Western Pacific, 2000 meters, the type, a male.

Length.—29 mm.

Remarks.—The only known specimen is probably the male of *M. megalodontis*, *niger*, *ferox*, or *cirrifer* (Bertelsen, 1951, p. 54).

Melanocetus nudus Beebe and Crane

Xenoceratias nudus Beebe and Crane, 1947, Zoologica, 31: 155, fig. 2—Pacific, ca. 9° N., 85° W., 914 meters.

Melanocetus nudus Bertelsen, 1951, Dana Rep., 39: 54, fig. 20.

Deep-abyssal record.—Gulf of Panama, 3000 meters, one male specimen.

Distribution.—Eastern Pacific off Costa Rica and in the Gulf of Panama, one deep-abyssal specimen and one from 914 meters.

Length.—29–31 mm.

Remarks.—Females and larvae unknown. This species is probably the male of *M. megalodontis*, *niger*, *ferox* or *cirrifer* and perhaps is not distinct from *M. longirostris* (Bertelsen, 1951, p. 54).

Melanocetus polyactis Regan

Melanocetus polyactis Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Gulf of Panama, 2200 meters.

Melanocetus polyactis Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 34, pl. 8, fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 53, fig. 78; Bertelsen, 1951, op. cit., 39: 40, 54, figs. 14, 21.

SYNONYMY OF MALES

Rhynchoceratias rostratus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 44 (part).

Rhynchoceratias leucorhinus Regan, 1926, op. cit., p. 44 (part).

Deep-abyssal records.—Gulf of Panama, 2200 meters, three specimens.

Gulf of Panama, 2000 meters, one specimen.

Distribution.—Eastern Pacific, only in the Gulf of Panama and in ca. 2° N., 87° W. Five specimens known, four deep-abyssal, one in 1500 meters. Larvae, six specimens, from ca. 2° N., 87° W.

Length.—22–90 mm.

Melanocetus tumidus Parr

Melanocetus tumidus Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 28, fig. 10—Atlantic off Bermuda.

Melanocetus tumidus Regan and Trewavas, 1932, Dana Rep., 2: 27.

Distribution.—Western Atlantic, only one specimen, a young female, 1409 meters.

Length.—21 mm.

Remarks.—Probably a young female *M. murrayi*, although not mentioned by Bertelsen (1951).

Family HIMANTOLOPHIDAE

Bertelsen (1951) considered valid three species of the single genus *Himantolophus* and retained a fourth until further material proves to which female species the two male specimens should be assigned. *H. groenlandicus* is one of the larger ceratioids, reaching a length of nearly two feet. The family is included here for the sake of completeness. There is no evidence that any of the species inhabits deep-abyssal waters. Males are probably free-living throughout life.

Himantolophus groenlandicus Reinhardt

Himantolophus groenlandicus Reinhardt, *1837, Dansk Vidensk. Selsk. Afhandl., (4), 7: 116, pl. 4—off Greenland.

Himantolophus groenlandicus Reinhardt, *1857, Grønl. geogr. statist. besk. H. Rink, 2: 23; Lütken, 1878, Dansk Vidensk. Selsk. Skr., (5), 11, (5), pl. 2, fig. 5; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 51; Girard, *1893, Bull. Soc. Geogr. Lisboa, 11: 603, pl. 1; Goode and Bean, 1895, Ocean. Ichth., p. 493, fig. 405; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2733; Ehrenbaum, 1902, Fauna Arct., 2: 76; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 40, pl. 12, fig. 1, text fig. 23; Regan and Trewavas, 1932, Dana Rep., 2: 13, 59, pl. 1, fig. 1, text fig. 88; Nobre, 1935, Fauna Mar. Portugal, 1: 233, pl. 32, fig. 105, pl. 32, a, fig. 105, a, b; Barbour, 1942, Proc. New England Zool. Club, 21: 82, pl. 15; Coelho, 1942, Trav. Stat. Biol. Marit. Lisbonne, 46: 90; Bertelsen, 1951, Dana Rep., 39: 60, figs. 23–25, 26, a–e.

Himantolophus reinhardtii Lütken, 1878, Dansk Vidensk. Selsk. Skr., (5), 11, (5), p. 320, pls. 1, 2, figs. 1–4; 1887, op. cit., (6), 4, (5), p. 325, pl., text figs.; 1895, Vidensk. Medd. Dansk naturh. Foren., 1894: 78; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 51; Ehrenbaum, 1902, Fauna Arct., 2: 76; *1936, Naturg. wirtsch. Bedeut. Seefische Nordeur., p. 163; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 581, figs. 11, 18; Holt and Byrne, *1909, Mem. Challenger Soc., 1: 195, pls. 1, 2; Osório, 1909, Mem. Mus. Bocage, Lisboa, 1, (1), p. 18, pl. 1, figs. 5, 6; Seabra, *1911, Bull. Soc.

- Port. Sci. Nat., 5, (3), p. 163; Williamson, 1911, Ann. Rep. Fish. Bd. Scotland, 1909, (3), p. 51, pl. 3; Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-1903, 15, Zool., 7: 198; Saemundsson, 1922, Vidensk. Medd. Dansk naturh. Foren., 74: 183; 1927, op. cit., 84: 168; 1949, Zool. Iceland, 4, (72), p. 46 (further references, Iceland); Barnard, 1927, Ann. So. Afr. Mus., 21: 1006, pl. 37, fig. 2; Fage, 1929, Faune Ichth. Atl. Nord, 2, figs.; Bigelow and Barbour, 1944, Proc. New England Zool. Club, 23: 14; Smith, 1949, Sea Fishes So. Afr., p. 429, fig. 1230; Rae, 1951, Ann. Biol. Cons. Perm. Intern. Explor. Mer, 7: 38.
- Corynolophus reinhardti* Gill, 1878, Proc. U. S. Nat. Mus., 1: 228; Goode and Bean, 1895, Ocean. Ichth., p. 494; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2733; Tanaka, 1908, Jour. Coll. Sci. Imp. Univ. Tokyo, 23, (13), p. 22, pl. 1, fig. 5; 1931, Jour. Fac. Sci. Imp. Univ. Tokyo, Zool., 3, (1), p. 53; Jordan, Tanaka, and Snyder, 1913, Jour. Coll. Sci. Imp. Univ. Tokyo, 33, (1), p. 427.
- ?*Corynophorus compressus* Osório, 1912, Mem. Mus. Bocage, Lisboa, 4: 89, figs. 1, 2; Nobre, 1935, Fauna Mar. Portugal, 1: 235, pl. 32, fig. 105, c, pl. 33, fig. 106.
- Corynolophus sagamius* Tanaka, 1918, Fig. Descr. Fishes Japan, 27: 491, pl. 134, fig. 377.
- Corynolophus globosus* Tanaka, 1918, op. cit., 29: 529, pl. 139, fig. 388.
- ?*Lipactis megalops* Beebe, 1929, Zoologica, 12: 19.
- Himantolophus danae* Regan and Trewavas, 1932, Dana Rep., 2: 60, pl. 1, fig. 2, text figs. 87, 88.
- Himantolophus globosus* Barbour, 1942, Proc. New England Zool. Club, 21: 82, pls. 12, 14; Bigelow and Barbour, 1944, op. cit., 23: 14.
- Himantolophus kainarae* Barbour, 1942, op. cit., 21: 82.
- Himantolophus ranoides* Barbour, 1942, op. cit., p. 83, pls. 13, 14.

SYNONYMY OF MALES

- Lipactis tumidus* Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 566; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 43 (part), pl. 12, fig. 2; ?Roule and Angel, 1930, Rés. Camp. Sci. Monaco, 79: 122, pl. 6, fig. 164; ?Norman, 1930, Disc. Rep., 2: 357; Regan and Trewavas, 1932, Dana Rep., 2: 61; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1349, fig. 567.
- Rhynchoceratias brevirostris* Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 566; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 43, pl. 13, fig. 1, text fig. 25, a; Norman, 1930, Disc. Rep., 2: 357; Regan and Trewavas, 1932, Dana Rep., 2: 62.
- Rhynchoceratias onchorhynchus* Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 566; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 44 (part), pl. 13, fig. 3, text fig. 25, c; Parr, 1930, Copeia, p. 131, fig. 5; Regan and Trewavas, 1932, Dana Rep., 2: 62.
- ?*Rhynchoceratias altirostris* Regan and Trewavas, 1932, op. cit., p. 62, fig. 90.
- Deep-abyssal records*.—Western Atlantic, ca. 8° N., 44° W., 4000 meters, two male specimens.

Eastern Atlantic, ca. 17° N., 29° W., 3000 meters, one young female specimen.

Western Atlantic, ca. 8° N., 44° W., 2500 meters, one male specimen.

Western Atlantic, ca. 17° N., 64° W., 2500 meters, one male specimen.

Distribution.—Eastern Atlantic from Iceland to South Africa. Western Atlantic from Greenland to off northern South America. Western Pacific, South China Sea and Japan. More than forty specimens known, some washed ashore or from an unknown depth, twenty-four recorded between 30 and 1500 meters, and five from deep-abyssal waters. Larvae have been taken in the western, eastern and southern Atlantic, off South Africa, in the northern Indian Ocean, and the western, southern and eastern Pacific.

Length.—13–580 mm.

Himantolophus appeli Clarke

Aegeonichthys appeli Clark, 1878, Trans. New Zealand Inst., 10: 245, pl. 6
—New Zealand.

Aegeonichthys appeli Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 52; Goode and Bean, 1895, Ocean. Ichth., p. 494; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 582, fig. 19; Waite, 1911, Trans. New Zealand Inst., 44: 194, pl. 10; Phillipps, 1927, New Zealand Mar. Dept. Fish. Bull., 1: 55.

Himantolophus appeli Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 41; Regan and Trewavas, 1932, Dana Rep., 2: 60, fig. 89; Bertelsen, 1951, op. cit., 39: 66.

Distribution.—New Zealand. Only two specimens known, one washed ashore, the other caught on a line, depth unknown.

Length.—310–410 mm.

Himantolophus azurlucens Beebe and Crane

Himantolophus azurlucens Beebe and Crane, 1947, Zoologica, 31: 155, pl. 1, text figs. 3, 4—Pacific off Panama, ca. 7° N., 79° W.

Himantolophus azurlucens Bertelsen, 1951, Dana Rep., 39: 66.

Distribution.—Eastern Pacific, only the type known, 914 meters.

Length.—123 mm.

Himantolophus rostratus Regan

Rhynchoceratias rostratus Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 567
—Gulf of Panama.

Rhynchoceratias rostratus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 44 (part), pl. 13, fig. 4, text fig. 25; Regan and Trewavas, 1932, Dana Rep., 2: 62.

Himantolophus rostratus Bertelsen, 1951, op. cit., 39: 55, 60, figs. 25, d, e, 26, f.

Deep-abyssal records and distribution.—Eastern Pacific, 2700 meters, the type.

Eastern Atlantic, ca. 17° N., 24° W., 2000 meters, one specimen.

Length.—38–46 mm.

Remarks.—Both specimens are males and may belong to different species. The Atlantic example, 46 mm., is the largest known free-living male ceratioid.

Family DICERATIIDAE

Two genera and three species are contained in this family; a third genus, *Laevoceratias*, based on a single male specimen, is retained until further material can connect it with one of the other genera.

Diceratias bispinosus Günther

Ceratias (Diceratias) bispinosus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 53, pl. 11, fig. B—Banda Sea, ca. 4° S., 129° E., 658 meters.

Ceratias bispinosus Alcock, 1896, Jour. Asiat. Soc. Bengal, 65: 318; Alcock and McArdle, 1900, Ill. Zool. Investigator, Fishes, pl. 35, fig. 2.

Ceratias (Diceratias) bispinosus Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 56.

Diceratias bispinosus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 42, fig. 24; Regan and Trewavas, 1932, Dana Rep., 2: 31, 58, figs. 29, a, 85, a; Bertelsen, 1951, op. cit., 39: 67, 69, figs. 27, 28.

Distribution.—Western Pacific in the Banda Sea. North Indian Ocean, Laccadive Sea. Two specimens, 658 and 1163 meters. Two larvae have been recorded, one from the Celebes Sea and one from the north Indian Ocean.

Length.—10–140 mm.

Remarks.—Males unknown.

Paroneiroides glomerosus Alcock

Paroneiroides glomerosus Alcock, 1890, Ann. Mag. Nat. Hist., (6), 6: 206, pl. 9, fig. 6—Bay of Bengal, ca. 15° N., 81° E.

Paroneiroides glomerosus (glomerulosus of authors) Goode and Bean, 1895, Ocean. Ichth., p. 493; Alcock, 1896, Jour. Asiat. Soc. Bengal, 65: 318; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 579, fig. 15; Norman, 1930, Disc. Rep., 2: 356, fig. 46; Regan and Trewavas, 1932, Dana Rep., 2: 58; Bertelsen, 1951, op. cit., 39: 70.

Oneirodes glomerosus Alcock, 1899, Descr. Cat. Indian Deep-sea Fishes, p. 57; 1902, Nat. Indian Seas, p. 236, fig. 32; Alcock and McArdle, 1900, Ill. Zool. Investigator, Fishes, pl. 28, fig. 4.

Diceratias glomerulosus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 42; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1344, fig. 563.

Deep-abyssal record.—North Indian Ocean, 2304 meters, the type.

Distribution.—North Indian Ocean. Southeastern Atlantic, ca. 15° S., 10° E. Only two specimens known, one deep-abyssal, the other in 600-700 meters.

Length.—26-28 mm.

Remarks.—Males and larvae unknown.

Paroneirodes wedli Pietschmann

Phrynichthys wedli Pietschmann, 1926, Anz. Akad. Wiss. Wien, 63, (11), p. 89—Madeira.

Phrynichthys wedli Pietschmann, 1930, Ann. Nat. Mus. Wien, 44: 419, fig.; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1344, fig. 564.

Paroneirodes wedli Regan and Trewavas, 1932, Dana Rep., 2: 58; Bertelsen, 1951, op. cit., 39: 70.

Distribution.—Eastern Atlantic, known only from the type. Depth of capture unknown.

Length.—55 mm.

Remarks.—Perhaps not distinct from *P. glomerosus*. Males and larvae unknown.

Laevoceratias liparis Parr

Laevoceratias liparis Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 33, fig. 13—off the Bahama Islands.

Laevoceratias liparis Regan and Trewavas, 1932, Dana Rep., 2: 93; Bertelsen, 1951, op. cit., 39: 70, fig. 29.

Distribution.—Western Atlantic. Known only from the type, a male specimen taken at a depth of 1609 meters.

Length.—23 mm.

Family ONEIRODIDAE

The wealth of material assigned to the family Oneirodidae has been separated by Bertelsen (1951) into fifteen genera and about forty species. As with all ceratioids, variability and ontogenetic changes in appearance greatly complicate the taxonomy of the

group. In some instances, described species of the genera *Oneirodes* and *Chaenophryne* can neither be separated nor synonymized, with present knowledge. Bertelsen has referred to these as "groups" of species and this procedure is followed in the present paper. Parasitic males are not known and Bertelsen reported evidence that they are probably free-living throughout life, attaching to the female temporarily only.

Oneirodes cristatus Regan and Trewavas

Dolopichthys cristatus Regan and Trewavas, 1932, Dana Rep., 2: 67, fig. 93—
Banda Sea, ca. 5° S., 131° E., 2500 meters.

Oneirodes cristatus Bertelsen, 1951, op. cit., 39: 79, fig. 31, c, d.

Deep-abyssal records and distribution.—Western Pacific, Banda Sea, 4000 meters, 2500 meters, two specimens.

Western Pacific north of Celebes, ca. 3° N., 123° E., 3500 meters, one specimen.

Length.—30–215 mm.

Remarks.—Males and larvae unknown.

Oneirodes eschrichti group. Table 27.

Oneirodes eschrichtii Lütken, *1871, Overs. Dansk Vidensk. Selsk. Forhandl., p. 56, pl. 2—off Greenland.

Oneirodes eschrichtii Lütken, 1878, Dansk Vidensk. Selsk. Skr., (5), 11, (5), pl. 2, fig. 6; Gill, 1878, Proc. U. S. Nat. Mus., 1: 218; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 56; Goode and Bean, 1895, Ocean. Ichth., p. 492; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2732; Ehrenbaum, 1902, Fauna Arct., 2: 76; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 26 (part), fig. 17; Regan and Trewavas, 1932, Dana Rep., 2: 63; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1140, fig. 479; Maul, 1949, Bol. Mus. Mun. Funchal, 4, (9), p. 34, figs. 14–17.

Oneirodes megaceros Holt and Byrne, 1908, Ann. Mag. Nat. Hist., (8), 1: 93; 1908, Rep. Fish. Ireland 1906, Sci. Invest., 5: 60; Murray and Hjort, 1912, Depths of Ocean, pp. 94, 614, fig. 81; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1339.

?*Dermatias platynogaster* Radcliffe, 1912, Proc. U. S. Nat. Mus., 42: 206, pl. 17, fig. 3.

Dolopichthys anisacanthus Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 562; Regan and Trewavas, 1932, Dana Rep., 2: 72, pl. 2, fig. 2, text fig. 105.

Dolopichthys heteracanthus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 28 (part).

Dolopichthys megaceros Regan, 1926, op. cit., p. 29 (part); Regan and Trewavas, 1932, Dana Rep., 2: 67, 71, fig. 103; Koefoed, 1944, Rep. Sci. Res. M.

- Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 6, pl. 1, figs. 4, *a*, *b*, 5, pl. 3, fig. 6.
- ?*Dolopichthys platynogaster* Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 29; Regan and Trewavas, 1932, Dana Rep., 2: 68, fig. 95.
- Dolopichthys* sp. Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 5; Norman, 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 115, figs. 40, 41.
- ?*Dolopichthys (Dermatias) platynogaster* Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 14.
- Dolopichthys obtusus* Parr, 1927, op. cit., p. 16, fig. 5; Regan and Trewavas, 1932, Dana Rep., 2: 71.
- Dolopichthys tentaculatus* Beebe, 1932, Zoologica, 13: 88, fig. 23; 1937, op. cit., 22: 207; Regan and Trewavas, 1932, Dana Rep., 2: 70; Hollister and Beebe, 1934, Bull. N. Y. Zool. Soc., 37: 188, fig.
- Dolopichthys digitatus* Regan and Trewavas, 1932, Dana Rep., 2: 68, fig. 94.
- Dolopichthys simplex* Regan and Trewavas, 1932, op. cit., p. 68, fig. 96.
- Dolopichthys pollicifer* Regan and Trewavas, 1932, op. cit., p. 69, fig. 97.
- Dolopichthys diadematus* Regan and Trewavas, 1932, loc. cit., fig. 98.
- Dolopichthys brevifilis* Regan and Trewavas, 1932, loc. cit., fig. 99.
- Dolopichthys pennatus* Regan and Trewavas, 1932, loc. cit., fig. 100.
- Dolopichthys frondosus* Regan and Trewavas, 1932, op. cit., p. 70, fig. 101.
- Dolopichthys cirrifer* Regan and Trewavas, 1932, loc. cit., fig. 102.
- Dolopichthys plumatus* Regan and Trewavas, 1932, op. cit., p. 71, fig. 104.
- Dolopichthys heteronema* Regan and Trewavas, 1932, op. cit., p. 72, fig. 106.
- Dolopichthys pilotus* Regan and Trewavas, 1932, op. cit., p. 73, fig. 107.
- Dolopichthys multifilis* Regan and Trewavas, 1932, loc. cit., fig. 108.
- Dolopichthys claviger* Regan and Trewavas, 1932, loc. cit., fig. 109.
- ?*Dolopichthys hibernicus* Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42: 325, fig. 4.
- ?*Oneirodes theodor-tissieri* Belloc, 1938, Rev. Trav. Pêches Marit., 11: 303, figs. 23, 25, 26.
- Oneirodes bulbosus* Chapman, 1939, Proc. U. S. Nat. Mus., 86: 538, fig. 70; Clemens and Wilby, 1946, Bull. Fish. Res. Bd. Canada, 68: 338, fig. 253.
- Oneirodes eschrichtii* group Bertelsen, 1951, Dana Rep., 39: 79, figs. 31, *e-g*, 32-37.

SYNONYMY OF MALES

- Rhynchoceratias leucorhinus* Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 44 (part).
- Caranactis pumilus* Regan and Trewavas, 1932, Dana Rep., 2: 59, fig. 86.
- Trematorhynchus leucorhinus* Regan and Trewavas, 1932, op. cit., p. 91 (part).

Deep-abyssal records.—Eastern Pacific, Gulf of Panama and ca. 0° 18' S., 99° W., 2000 meters, five specimens from five hauls.

Western Pacific in the Sulu Sea and north of New Guinea, 2500–2000 meters, four specimens in four hauls.

North Indian Ocean near Ceylon, ca. 5° N., 80° E., 2500 meters, one specimen.

Southeastern Atlantic, ca. 15° S., 5° W., 2000 meters, one specimen.

Eastern Atlantic, ca. 25° N., 20° W., 3500 meters, one specimen.

North Atlantic, 8°–32° N., 17°–65° W., 2500–2000 meters, nine specimens from eight hauls.

Distribution.—Atlantic from Greenland and ca. 53° N., 12° W. south to ca. 8° N., 44° W. and 15° S., 5° W. Eastern Pacific from the Gulf of Panama to ca. 0° 18' S., 99° W. (?) Northeastern Pacific off the Queen Charlotte Islands (*O. bulbosus* Chapman, included here with some doubt). Western Pacific around the Dutch East Indies and the Philippines. Indian Ocean south of Ceylon and in the Gulf of Aden. Forty-two specimens in all, twenty-one of them deep-abyssal, two from an unknown depth (including the type), the rest between 300 and 1700 meters.

The *Dana* took 163 larvae in the eastern, western and southeastern Atlantic, the eastern and western Pacific, and the north Indian Ocean.

Length.—14–227 mm.

Remarks.—Many or all of the species included in this group may be synonymous.

Oneirodes flagellifer group

Dolopichthys flagellifer Regan and Trewavas, 1932, *Dana Rep.*, 2: 74, fig. 111
—Indian Ocean near Ceylon, ca. 5° N., 80° E.

Dolopichthys thysanophorus Regan and Trewavas, 1932, *op. cit.*, p. 74, fig. 110.

Oneirodes flagellifer group Bertelsen, 1951, *op. cit.*, 39: 84, figs. 31, *j, k*.

Deep-abyssal records and distribution.—North Indian Ocean, 2200 meters, the type.

Western Pacific, Sulu Sea, 2200 meters, two specimens in one haul.

Length.—17–32 mm.

Remarks.—Males and larvae unknown.

Oneirodes schmidti group

Dolopichthys schmidti Regan and Trewavas, 1932, *Dana Rep.*, 2: 75, fig. 113
—Banda Sea.

Dolopichthys macronema Regan and Trewavas, 1932, op. cit., p. 66, fig. 91.

Dolopichthys mirus Regan and Trewavas, 1932, op. cit., p. 74, fig. 112.

Oneirodes schmidti group Bertelsen, 1951, op. cit., 39: 84, fig. 3, h, i.

Deep-abyssal records.—Western Pacific, 3500 meters, the type. North Indian Ocean, ca. 1° N., 96° E., 2000 meters, one specimen.

Distribution.—Western Pacific and north Indian Ocean, two deep-abyssal records. Western Atlantic, ca. 17° N., 64° W., one specimen, 300–500 meters.

Length.—37–59 mm.

Remarks.—Males and larvae unknown.

Oneirodes inimicus Fraser-Brunner

Dolopichthys inimicus Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42: 324, fig. 3—Atlantic, ca. 53° N., 13° W.

Oneirodes inimicus Bertelsen, 1951, Dana Rep., 39: 85.

Distribution.—Eastern Atlantic off southwestern Ireland, one specimen, 320 meters.

Length.—33 mm.

Remarks.—Males and larvae unknown.

Oneirodes acanthias Gilbert

Monoceratias acanthias Gilbert, 1915, Proc. U. S. Nat. Mus., 48: 379, pl. 22, fig. 4—off Santa Cruz Island, southern California, 1397–1629 meters.

Dolopichthys acanthias Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 28; Regan and Trewavas, 1932, Dana Rep., 2: 76, fig. 114; Schultz, 1934, Copeia, p. 66, figs. 1, 2; Bolin and Myers, 1950, Stanf. Ichth. Bull., 3: 203–208.

Dolopichthys (Monoceratias) acanthias Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 15.

Dolopichthys thompsoni Schultz, 1934, Copeia, p. 66, figs. 3, 4.

Oneirodes acanthias Bertelsen, 1951, Dana Rep., 39: 85, fig. 38.

Distribution.—Eastern Pacific off southern California, three specimens, 900 meters and 1397–1629 meters. North Pacific, ca. 54° N., 159° W., one specimen in 900 meters.

Length.—32–80 mm.

Remarks.—Males and larvae unknown.

Oneirodes carlsbergi Regan and Trewavas

Dolopichthys carlsbergi Regan and Trewavas, 1932, Dana Rep., 2: 76, fig. 115 Gulf of Panama, ca. 500 meters.

Oneirodes eschrichtii Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 26 (part).

Dolopichthys heteracanthus Regan, 1926, op. cit., p. 28 (part); Norman, 1930, Disc. Rep., 2: 353 (part).

Oneirodes carlsbergi Bertelsen, 1951, Dana Rep., 39: 86, figs. 31, *m-o*, 39.

Deep-abyssal records.—Eastern Atlantic, ca. 15° N., 26° W., 2000 meters, one specimen.

Mid-Atlantic, ca. 12° N., 35° W., 2000 meters, one specimen.

Distribution.—Eastern Atlantic off Cape Verde and the Cape Verde Islands, one deep-abyssal specimen and two in 900 meters. Mid-Atlantic, one deep-abyssal record. Eastern Pacific in the Gulf of Panama and ca. 2° N., 87° W., three specimens, 500-1700 meters. Western Pacific, ca. 16° N., 120° E., one specimen in ca. 300-500 meters.

Length.—25-205 mm.

Remarks.—Males and larvae unknown.

Oneirodes luetkeni Regan

Dolopichthys luetkeni Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 562—Gulf of Panama.

Dolopichthys heteracanthus Regan, 1925, loc. cit.; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 28 (part), pl. 5, fig. 1; Regan and Trewavas, 1932, Dana Rep., 2: 69, 77, fig. 117.

Dolopichthys luetkeni Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 27, pl. 4, fig. 2; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 15; Regan and Trewavas, 1932, Dana Rep., 2: 76, fig. 116; Beebe and Crane, 1947, Zoologica, 31: 159.

Oneirodes luetkeni Bertelsen, 1951, Dana Rep., 39: 86, figs. 31, *p-s*, 40.

Deep-abyssal records.—Gulf of Panama, 2000-2500 meters, five specimens from four hauls.

Distribution.—Eastern Pacific in the Gulf of Panama, off Costa Rica, and near Cocos Island, twenty-six specimens known, five of them deep-abyssal, the others between 300-500 and 1700 meters.

Length.—16-160 mm.

Remarks.—Males and larvae unknown.

Oneirodes melanocauda Bertelsen

Oneirodes melanocauda Bertelsen, 1951, Dana Rep., 39: 87, figs. 31, *l*, 41—South China Sea, ca. 6° N., 114° E.

Deep-abyssal record.—Western Pacific, 2500 meters, the type.

Distribution.—Western Pacific, one deep-abyssal record. Three larvae are known, one from the western Pacific, one from the north Indian Ocean and one from the western Atlantic.

Length.—8–21 mm.

Remarks.—The type is a metamorphosing female. Adolescent and adult stages are unknown.

Microlophichthys microlophus Regan. Table 28.

Dolopichthys microlophus Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 563—Atlantic, ca. 17° N., 24° W.

Dolopichthys heteracanthus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 28 (part).

Dolopichthys allector Regan, 1926, op. cit., p. 28 (part).

Dolopichthys microlophus Regan, 1926, op. cit., p. 29, fig. 18; Regan and Trewavas, 1932, Dana Rep., 2: 77, figs. 118, 119.

Dolopichthys analogus Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), pp. 16, 20, fig. 7; Regan and Trewavas, 1932, Dana Rep., 2: 78, fig. 120; Beebe, 1937, Zoologica, 22: 207.

Dolopichthys exiguus Regan and Trewavas, 1932, Dana Rep., 2: 78, fig. 121.

Dolopichthys implumis Regan and Trewavas, 1932, loc. cit., fig. 122; Beebe and Crane, 1947, Zoologica, 31: 160, fig. 5.

Microlophichthys microlophus Bertelsen, 1951, Dana Rep., 39: 89, 90, figs. 42–45.

SYNONYMY OF MALES

Rhynchoceratias leucorhinus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 44 (part).

Deep-abyssal records.—Eastern Atlantic, 0° 31' S., 11° 02' W., 4000 meters, one specimen.

Eastern Atlantic off the Cape Verde Islands, 2000 meters, the type.

Western Atlantic off Bermuda and in the Caribbean Sea, 2000, 2012 meters, two specimens.

Gulf of Panama, 2000–2200 meters, five specimens in four hauls.

Western Pacific, north of New Guinea, ca. 3° N., 137° E., 2500 meters, one specimen.

Western Pacific, Banda Sea, ca. 4° N., 128° E., 2000 meters, one specimen.

Indian Ocean, ca. 5° N., 90° E., 2000 meters, one specimen.

Distribution.—Eastern Atlantic off Cape Verde Islands and in ca. 0° S., 11° W. Western Atlantic off Bermuda and in the Caribbean Sea. Eastern Pacific in the Gulf of Panama, off Costa Rica

and near the Galapagos Islands. Western Pacific around the Dutch East Indies and in the South China Sea (ca. 15° N., 115° E.). North Indian Ocean between Sumatra and Ceylon. Twenty-one specimens in all, twelve of them deep-abyssal, the others in 914–1800 meters. Larvae known from the eastern, southeastern and western Atlantic, the eastern Pacific and the north Indian Ocean.

Length.—2.4–62 mm.

Microlophichthys andracanthus Bertelsen

Microlophichthys andracanthus Bertelsen, 1951, Dana Rep., 39: 92, fig. 47—Caribbean Sea, ca. 17° N., 64° W.

Deep-abyssal record and distribution.—Western Atlantic, 2700 meters, the type, an adult male.

Length.—24 mm.

Remarks.—Females and larvae unknown.

Tyrannophryne pugnax Regan and Trewavas

Tyrannophryne pugnax Regan and Trewavas, 1932, Dana Rep., 2: 83, pl. 4, fig. 1—Pacific, ca. 18° S., 153° W.

Tyrannophryne pugnax Bertelsen, 1951, op. cit., 39: 93, fig. 48.

Deep-abyssal record and distribution.—South Pacific near Tahiti, 2500 meters, one specimen.

Length.—18.5 mm.

Remarks.—Males and larvae unknown.

Leptacanthichthys gracilispinis Regan

Dolopichthys gracilispinis Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 563—Gulf of Panama.

Dolopichthys gracilispinis Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 30, pl. 5, fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 80, fig. 128.

Leptacanthichthys gracilispinis Bertelsen, 1951, op. cit., 39: 94, fig. 49.

Deep-abyssal records and distribution.—Eastern Pacific, 2200 meters, the type.

Western Atlantic, ca. 28° N., 56° W., 2000 meters, one specimen.

Length.—50–65 mm.

Remarks.—Males and larvae unknown.

Chirophyrre xenolophus Regan and Trewavas

Chirophyrre xenolophus Regan and Trewavas, 1932, Dana Rep., 2: 82, figs. 131, 132—western Pacific, ca. 14° N., 119° E.

Chirophryne xenolophus Bertelsen, 1951, op. cit., 39: 94, fig. 50.

Distribution.—Western Pacific, South China Sea, 1700 meters, type only.

Length.—15 mm.

Remarks.—Males and larvae unknown.

Ctenochirichthys longimanus Regan and Trewavas

Ctenochirichthys longimanus Regan and Trewavas, 1932, Dana Rep., 2: 82, pl. 3, fig. 3—Gulf of Panama.

Dolopichthys heteracanthus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 7 (part).

Ctenochirichthys longimanus Bertelsen, 1951, Dana Rep., 39: 95, figs. 51, 52.

SYNONYMY OF MALES

Trematorhynchus multiradiatus Beebe and Crane, 1947, Zoologica, 31: 166, fig. 11.

Deep-abyssal record.—Gulf of Panama, 2000 meters, the type.

Distribution.—Eastern Pacific, Gulf of Panama, two specimens, 1700 and 910 meters, and one deep-abyssal specimen. Two male larvae known, one in the Gulf of Panama and one from the eastern Atlantic.

Length.—6.5–47 mm.

Dolopichthys sp.

Rhynchoceratias leucorhinus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 44 (part).

Dolopichthys sp. Regan and Trewavas, 1932, Dana Rep., 2: 9, 10; Bertelsen, 1951, op. cit., 39: 98, figs. 54, a, 55, 56.

Distribution.—Eastern and western Atlantic. Eastern, southern and western Pacific. North Indian Ocean. Indian Ocean off South Africa.

Length.—2.4–17.3 mm.

Remarks.—Under this name Bertelsen (1951) listed the *Dolopichthys* larval and male specimens that cannot be separated into species.

Dolopichthys allector Garman

Dolopichthys allector Garman, 1899, Mem. Mus. Comp. Zool., 24: 81, pls. 13–15—Pacific off Panama, ca. 5° N., 86° W.

Dolopichthys allector Gill, 1908, Ann. Rep. Smithsonian Inst., p. 580, fig. 16; Regan and Trewavas, 1932, Dana Rep., 2: 78, 80; (?) Beebe and Crane, 1947, Zoologica, 31: 161, fig. 7; Bertelsen, 1951, Dana Rep., 39: 100.

Distribution.—Eastern Pacific, the type in 1409 meters and one specimen, perhaps belonging to this species, taken near the Galapagos Islands in 823 meters.

Length.—25 mm. and 72 mm. (type).

Remarks.—Males and larvae unknown.

Dolopichthys danae Regan

Dolopichthys danae Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 29, pl. 4, fig. 1—Atlantic, ca. 8° N., 44° W.

Dolopichthys danae Regan and Trewavas, 1932, Dana Rep., 2: 80, fig. 127; Bertelsen, 1951, op. cit., 39: 96, 98, 100, figs. 53, f, 54, d.

Deep-abysal record and distribution.—Eastern Atlantic, 4000 meters, type only.

Length.—95 mm.

Remarks.—Males and larvae unknown.

Dolopichthys niger Brauer

Dolopichthys niger Brauer, 1902, Zool. Anz., 25: 292—Indian Ocean, ca. 29° S., 89° E.

Oneirodes niger Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 316, pl. 15, fig. 6; 1908, op. cit., 15, (2), pp. 103, 184, pl. 32, figs. 7, 8, pl. 34, figs. 15, 16, pl. 44, figs. 2, 3.

Dolopichthys niger Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 27; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 14; Regan and Trewavas, 1932, Dana Rep., 2: 79, fig. 125; Bertelsen, 1951, op. cit., 39: 96, 100, fig. 53, a.

Deep-abysal records and distribution.—South Indian Ocean, 2500 meters, the type.

North Indian Ocean near Zanzibar, ca. 4° S., 48° E., 2000 meters, one specimen.

Length.—13-15 mm.

Remarks.—Males and larvae unknown.

Dolopichthys cornutus Gilchrist and von Bonde

Oneirodes cornutus Gilchrist and von Bonde, 1924, Rep. Fish. Mar. Biol. Surv. So. Afr., 3, (7), p. 23, pl. 6, fig. 2—South Africa, exact locality unknown.

Dolopichthys cornutus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 27; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 14; Barnard, 1927, Ann. So. Afr. Mus., 21: 1004; Regan and Trewavas, 1932, Dana Rep., 2: 63; Smith, 1949, Sea Fishes So. Afr., p. 429, fig. 1231.

Distribution.—South Africa, one specimen, depth of capture unknown.

Length.—16.5 mm.

Remarks.—Males and larvae unknown.

***Dolopichthys longicornis* Parr**

Dolopichthys longicornis Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 18, fig. 6—Bahama Islands.

Dolopichthys megaceros Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 29 (part).

Dolopichthys danae Regan, 1926, loc. cit. (part).

Dolopichthys longicornis Norman, 1930, Disc. Rep., 2: 354; Regan and Trewavas, 1932, Dana Rep., 2: 79; Beebe, 1937, Zoologica, 22: 207; Bertelsen, 1951, Dana Rep., 39: 96, 98, 100, figs. 53, *b-e*, 54, *c-f*, 57.

Dolopichthys pullatus Regan and Trewavas, 1932, op. cit., 2: 79, pl. 3, fig. 1, text fig. 123; Beebe and Crane, 1947, Zoologica, 31: 161, fig. 6.

Dolopichthys mucronatus Regan and Trewavas, 1932, Dana Rep., 2: 79, fig. 124.

Dolopichthys jubatus Regan and Trewavas, 1932, op. cit., pp. 79, 80, fig. 126.

Deep-abyssal records.—Banda Sea, ca. 2° S., 126° E., 3500 meters, one specimen.

South China Sea, ca. 19° N., 120° E., 2500 meters, one specimen.

Eastern Atlantic, ca. 33° N., 16° W. and ca. 36° N., 26° W., 2000 meters, two specimens.

Western Atlantic, 2012 meters, the type.

Distribution.—Eastern Atlantic from near the Azores and Madeira to ca. 2° S., 9° W., two deep-abyssal records and two specimens in 800–1000 meters. Western Atlantic off Bermuda and the Bahamas, one deep-abyssal specimen and two from 1645 and 1829 meters. Eastern Pacific, Gulf of Panama, one specimen, 914 meters. Western Pacific, two deep-abyssal records. North Indian Ocean near the Seychelles, ca. 1° S., 62° E., one specimen in 1700 meters. Eleven specimens in all.

Length.—23–114 mm.

Remarks.—Most of the larval and male specimens listed as *Dolopichthys* spp. probably belong to this species (Bertelsen, 1951, p. 98).

***Danaphryne nigrifilis* Regan and Trewavas**

Dolopichthys nigrifilis Regan and Trewavas, 1932, Dana Rep., 2: 67, fig. 92—South China Sea, ca. 19° N., 120° E.

Dolopichthys albifilosa Waterman, 1939, Bull. Mus. Comp. Zool., 85: 89, figs. 5, 6.

Danaphryne nigrifilis Bertelsen, 1951, Dana Rep., 39: 102, figs. 58, 59.

Deep-abyssal record.—Western Pacific, 2000 meters, the type.

Distribution.—Western Pacific, one deep-abyssal record. Western Atlantic, ca. 35° N., 69° W., one specimen, depth of capture unknown.

Length.—36–45 mm.

Remarks.—Males and larvae unknown.

Pentherichthys sp. Bertelsen

Pentherichthys sp. Bertelsen, 1951, Dana Rep., 39: 103, figs. 61, 62.

Rhynchoceratias leucorhinus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 44 (part).

Distribution.—Under this heading Bertelsen listed nineteen larval and four male specimens belonging to the genus *Pentherichthys*. These were taken by the *Dana* in the eastern and western Atlantic, the Gulf of Panama in the eastern Pacific, the western Pacific, and the north Indian Ocean.

Length.—5.3–15 mm.

Pentherichthys atratus Regan and Trewavas

Dolopichthys atratus Regan and Trewavas, 1932, Dana Rep., 2: 81, pl. 3, fig. 2, text fig. 129—Gulf of Panama, 1700 meters.

Dolopichthys allector Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 28 (part).

Dolopichthys atratus Beebe and Crane, 1947, Zoologica, 31: 162.

Pentherichthys atratus Bertelsen, 1951, Dana Rep., 39: 105, fig. 63.

Deep-abyssal records.—Gulf of Panama, 2200, 2000 meters, two specimens.

Distribution.—Eastern Pacific in the Gulf of Panama, off Costa Rica and near Cocos Island, two deep-abyssal records and five specimens in 914–1700 meters.

Length.—23–41.7 mm.

Remarks.—Males and larvae unknown.

Pentherichthys venustus Regan and Trewavas

Dolopichthys venustus Regan and Trewavas, 1932, Dana Rep., 2: 81, fig. 130—Atlantic, ca. 12° N., 20° W.

Dolopichthys allector Norman, 1930, Disc. Rep., 2: 353, fig. 43.

Pentherichthys venustus Bertelsen, 1951, Dana Rep., 39: 105.

Distribution.—Eastern Atlantic, type only, 250–300 meters.

Length.—36 mm.

Remarks.—Males and larvae unknown.

Lophodolus acanthognathus Regan

Lophodolus acanthognathus Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 563—Atlantic, ca. 28° N., 56° W., 2000 meters.

Oneirodes sp. Murray and Hjort, 1912, Depths of Ocean, p. 104, fig. 90.

Lophodolus acanthognathus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 30, pl. 6, fig. 1; Norman, 1930, Disc. Rep., 2: 354; Regan and Trewavas, 1932, Dana Rep., 2: 83; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 7; Beebe, 1937, Zoologica, 22: 207; Nybelin, 1948, Göteborgs K. Vetensk. Vitt.-Samh. Handl., (B), 5, (16), p. 86, fig. 9; Bertelsen, 1951, Dana Rep., 39: 107, figs. 64, b–d, 65; Grey, 1955, Fieldiana, Zool., 37: 299.

Lophodolus lyra Beebe, 1932, Zoologica, 13: 96, fig. 28; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 7, pl. 3, fig. 3.

Lophodolus Gregory, 1933, Trans. Amer. Phil. Soc., 23: 402, figs. 274, 276, a.

Deep-abyssal records.—Mid-Atlantic, ca. 47° N., 31° W., 4000, 3500 meters, two specimens.

Eastern Atlantic, ca. 36° N., 9° W., (?) 2000 meters, one specimen, depth of capture uncertain.

Western Atlantic, ca. 34° N., 70° W., 2700 meters, one specimen.

Western Atlantic, ca. 28° N., 56° W., 2000 meters, one specimen.

South China Sea, ca. 6° N., 118° E., 2200 meters, one specimen.

Distribution.—Atlantic from ca. 48° N., 49° W. south to ca. 2° S., 9° W. in the east and, in the west, to the Bahama Islands, five deep-abyssal specimens and fifty-six in 800–1829 meters. Western Pacific, one deep-abyssal record and one specimen in the Celebes Sea, 1000–1500 meters. Five larvae known, from the north Atlantic only.

Length.—10–70 mm.

Remarks.—Metamorphosed males unknown.

Lophodolus dinema Regan and Trewavas

Lophodolus dinema Regan and Trewavas, 1932, Dana Rep., 2: 83, pl. 4, fig. 3—South China Sea, ca. 19° N., 120° E.

Lophodolus dinema Bertelsen, 1951, op. cit., 39: 108, fig. 64, a.

Deep-abyssal record and distribution.—Western Pacific, 2000 meters, type only.

Length.—54 mm.

Remarks.—Males and larvae unknown.

Lophodolus indicus Lloyd

Lophodolus indicus Lloyd, 1909, Mem. Indian Mus., 2: 167, pl. 14, fig. 7—Indian Ocean off Travancore.

Lophodolus indicus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 30; Regan and Trewavas, 1932, Dana Rep., 2: 83; Bertelsen, 1951, op. cit., 39: 108.

Distribution.—North Indian Ocean, type only, 1624 meters.

Length.—65 mm.

Remarks.—Males and larvae unknown.

Chaenophryne longiceps group

Himantolophus groenlandicus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 40 (part).

Rhynchoceratias leucorhinus Regan, 1926, op. cit., p. 44 (part).

Trematorhynchus leucorhinus Regan and Trewavas, 1932, Dana Rep., 2: 91 (part).

Chaenophryne longiceps group Bertelsen, 1951, op. cit., 39: 110, figs. 68-70.

Distribution.—Eastern and western Atlantic. North Indian Ocean.

Length.—3.2-30 mm.

Remarks.—Under this heading Bertelsen discussed the larvae, males, and metamorphosing stages of females of the species *Chaenophryne longiceps*, *C. bicornis*, *C. quadrifilis*, *C. crenata* and *C. crosota*.

Chaenophryne longiceps Regan

Chaenophryne longiceps Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 564 (part)
—Gulf of Panama.

Chaenophryne longiceps Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 31 (part), pl. 6, fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 86, fig. 135; Bertelsen, 1951, op. cit., 39: 113, figs. 66, a, 71.

Deep-abyssal record and distribution.—Eastern Pacific, 2000 meters, type only.

Length.—27 mm.

Remarks.—Males and larvae unknown.

Chaenophryne bicornis Regan and Trewavas

Chaenophryne bicornis Regan and Trewavas, 1932, Dana Rep., 2: 85, fig. 133
—Atlantic, ca. 13° N., 18° W., 2500 meters.

Chaenophryne bicornis Bertelsen, 1951, op. cit., 39: 109, 113, fig. 66, c.

Deep-abyssal records and distribution.—Eastern Atlantic southeast of the Cape Verde Islands, 2500, 2200 meters, two specimens.

Length.—18-20 mm.

Remarks.—Males and larvae unknown.

Chaenophryne quadrifilis Parr

Chaenophryne longiceps var. *quadrifilis* Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 22, fig. 8, a—off Bermuda.

Chaenophryne longiceps Parr, 1927, op. cit., p. 22, fig. 8, b; Beebe, 1937, Zoologica, 22: 207.

Chaenophryne quadrifilis Regan and Trewavas, 1932, Dana Rep., 2: 87, fig. 136; Parr, 1937, Bull. Bingham Oceanogr. Coll., 3, (7), p. 63; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 8, pl. 1, figs. 2, 3; Bertelsen, 1951, Dana Rep., 39: 113.

Deep-abyssal record.—Off Bermuda, 2012 meters, two specimens, including the type.

Distribution.—Eastern Atlantic, ca. 35° N., 7° W., one specimen, 1000–1500 meters. Western Atlantic off Bermuda and the Bahamas, two deep-abyssal records and two specimens in 1409 and 1609 meters.

Length.—25–42 mm.

Remarks.—Males and larvae unknown.

Chaenophryne crenata Regan and Trewavas

Chaenophryne crenata Regan and Trewavas, 1932, Dana Rep., 2: 86, fig. 134—South China Sea, ca. 15° N., 115° E.

Chaenophryne crenata Bertelsen, 1951, op. cit., 39: 109, 114, fig. 66, b.

Distribution.—Western Pacific, type only, 1000–1500 meters.

Length.—25 mm.

Remarks.—Males and larvae unknown.

Chaenophryne crossota Beebe

Chaenophryne crossotus Beebe, 1932, Zoologica, 13: 83, fig. 21—off Bermuda.

Chaenophryne crossata Regan and Trewavas, 1932, Dana Rep., 2: 86.

Chaenophryne crossota Bertelsen, 1951, op. cit., 39: 114.

Distribution.—Western Atlantic, type only, 914 meters.

Length.—17 mm.

Remarks.—Males and larvae unknown.

Chaenophryne draco group

Himantolophus groenlandicus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 40 (part).

Rhynchoceratias leucorhinus Regan, 1926, op. cit., p. 44 (part).

Trematorhynchus leucorhinus Regan and Trewavas, 1932, Dana Rep., 2: 91 (part).

Trematorhynchus obliquidens Regan and Trewavas, 1932, op. cit., p. 92, fig. 148.

Chaenophryne draco group Bertelsen, 1951, op. cit., 39: 72, 109, 114, figs. 30, 67, 72, 73.

Distribution.—Eastern and western Atlantic. Eastern, southern and western Pacific. North Indian Ocean. South Africa.

Length.—3.5–20.5 mm.

Remarks.—Included under this heading are larvae, males, and metamorphosing females of *C. draco*, *C. parviconus*, and *C. ramifera*.

Chaenophryne draco Beebe

Chaenophryne draco Beebe, 1932, Zoologica, 13: 84, fig. 22—off Bermuda.

Chaenophryne draco Regan and Trewavas, 1932, Dana Rep., 2: 89; Bertelsen, 1951, op. cit., 39: 116.

Distribution.—Western Atlantic, type only, 1098 meters.

Length.—23 mm.

Remarks.—Males and larvae unknown.

Chaenophryne parviconus Regan and Trewavas

Chaenophryne parviconus Regan and Trewavas, 1932, Dana Rep., 2: 87, fig. 138—Gulf of Panama, 2000 meters.

Chaenophryne longiceps Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 31 (part).

Chaenophryne haplactis Regan and Trewavas, 1932, Dana Rep., 2: 87, fig. 137.

Chaenophryne atriconus Regan and Trewavas, 1932, op. cit., p. 87, fig. 139.

Chaenophryne columnifera Regan and Trewavas, 1932, op. cit., p. 88, fig. 140.

Chaenophryne melanodactylus Regan and Trewavas, 1932, op. cit., p. 88, fig. 141.

Chaenophryne macractis Regan and Trewavas, 1932, op. cit., p. 89, fig. 142; Imai, 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 46, figs. 6, 7.

Chaenophryne melanorhabdus Regan and Trewavas, 1932, Dana Rep., 2: 89, fig. 143.

Chaenophryne pterolophus Regan and Trewavas, 1932, op. cit., p. 89, fig. 144.

Chaenophryne pacis Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 9, pl. 2, figs. 6, 7.

Chaenophryne parviconus Beebe and Crane, 1947, Zoologica, 31: 158; Bertelsen, 1951, Dana Rep., 39: 117, fig. 74.

Deep-abyssal records.—Gulf of Panama, 2000–2200 meters, four specimens from three hauls.

Eastern Atlantic, ca. 36° N., 26° W. and ca. 30° N., 20° W., 2000 meters, two specimens.

Distribution.—Eastern Atlantic near the Canary Islands and off the Azores, and west to ca. 33° W., two deep-abyssal records and one specimen in 1500 meters. Eastern Pacific from the Gulf of Panama to ca. 4° S., 116° W., three deep-abyssal records (four specimens) and sixteen specimens in 732–1800 meters. Western Pacific, near Japan, one specimen in ca. 1000 meters. North Indian Ocean, ca. 12° S., 96° E., one specimen in ca. 1000 meters.

Length.—14.5–55 mm.

Remarks.—Perhaps a synonym of *C. draco* (Bertelsen, 1951, p. 118). Males and larvae unknown.

Chaenophryne ramifera Regan and Trewavas

Chaenophryne ramifera Regan and Trewavas, 1932, Dana Rep., 2: 90, fig. 146
—Gulf of Panama.

Chaenophryne fimbriata Regan and Trewavas, 1932, op. cit., p. 90, fig. 145;
Belloc, 1938, Rev. Trav. Pêches Marit., 11: 305, fig. 27.

Chaenophryne intermedia Belloc, 1938, loc. cit., figs. 24, 28.

Chaenophryne ramifera Belloc, 1938, loc. cit., fig. 29; Bertelsen, 1951, Dana Rep., 39: 118, fig. 75.

Deep-abyssal records.—Eastern Pacific, 2000 meters, the type. North Indian Ocean, ca. 1° N., 71° E., 2000 meters, one specimen.

Distribution.—Eastern Atlantic between the Azores and French West Africa, one specimen in 300–500 meters. Eastern Pacific, one deep-abyssal record. North Indian Ocean, one deep-abyssal record.

Length.—19–24 mm.

Remarks.—Males and larvae unknown.

Lasiognathus saccostoma Regan

Lasiognathus saccostoma Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 563—
Caribbean Sea, ca. 18° N., 79° W.

Lasiognathus saccostoma Regan, 1926, Oceanogr. Rep. Danish Dana Exp.
1920–22, 2: 31, pl. 7; Regan and Trewavas, 1932, Dana Rep., 2: 90;
Bertelsen, 1951, op. cit., 39: 119, figs. 76, 77, a.

Deep-abyssal record and distribution.—Western Atlantic, 2500 meters, type only.

Length.—75 mm.

Remarks.—Males and larvae unknown.

Lasiognathus beebei Regan and Trewavas

Lasiognathus beebei Regan and Trewavas, 1932, Dana Rep., 2: 90—off Ber-
muda.

Lasiognathus Beebe, 1930, Bull. N. Y. Zool. Soc., 33: 60, figs.; 1932, Nat. Geogr. Mag., 61: 64, 86, fig.; Gregory, 1933, Trans. Amer. Phil. Soc., 23: 403, figs. 275, 276, b.

Lasiognathus beebei Beebe, 1937, Zoologica, 22: 207; Bertelsen, 1951, Dana Rep., 39: 119, fig. 77, b.

Distribution.—Western Atlantic, type only, 1098 meters.

Length.—38 mm.

Remarks.—Males and larvae unknown.

Thaumatichthys pagidostomus Smith and Radcliffe

Thaumatichthys pagidostomus Smith and Radcliffe, 1912, Proc. U. S. Nat. Mus., 42: 580, pl. 72—Gulf of Tomini, Celebes.

Thaumatichthys pagidostomus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 31; Regan and Trewavas, 1932, Dana Rep., 2: 91; Bertelsen, 1951, op. cit., 39: 121, figs. 78–80 (misspelled *Thaumanichthys*).

SYNONYMY OF MALES

Lipactis tumidus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 43 (part).

Distribution.—Western Pacific, type only, 1393 meters. Four larvae were taken by the *Dana* in the western and southeastern Atlantic, and in the Indian Ocean off South Africa. The largest of these, a male approaching metamorphosis, was taken in the Caribbean at a depth of 2000 meters.

Length.—4.4–84 mm.

Amacrodon binghami Parr

Thaumatichthys binghami Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 25, fig. 9—off the Bahamas, 1609 meters.

Amacrodon binghami Regan and Trewavas, 1932, Dana Rep., 2: 91; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 7; Bertelsen, 1951, Dana Rep., 39: 122.

Distribution.—Western Atlantic off the Bahamas and in the Caribbean Sea, two specimens, 1050–1609 meters.

Length.—?–52 mm.

Remarks.—Males and larvae unknown.

Spiniphryne gladisfenae Beebe

Dolopichthys gladisfenae Beebe, 1932, Zoologica, 13: 86—off Bermuda.

Centrophryne gladisfenae Regan and Trewavas, 1932, Dana Rep., 2: 84.

Spiniphryne gladisfenae Bertelsen, 1951, op. cit., 39: 122, fig. 81.

Bertelsenia gladisfenae Whitley, 1954, Proc. Roy. Zool. Soc. New South Wales, 1952-53: 30.

Distribution.—Western Atlantic, type only, 1280 meters.

Length.—40 mm.

Remarks.—Males and larvae unknown.

Family CENTROPHRYNIDAE

This family was introduced by Bertelsen (1951, p. 124) for a single species. The adult male is unknown.

Centrophryne spinulosa Regan and Trewavas

Centrophryne spinulosa Regan and Trewavas, 1932, Dana Rep., 2: 84, pl. 4, fig. 2—north of New Guinea, ca. 1° S., 138° E.

Centrophryne spinulosa Bertelsen, 1951, op. cit., 39: 124, 126, figs. 84-87.

SYNONYMY OF MALES

Rhynchoceratias leucorhinus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 44 (part).

Deep-abyssal records and distribution.—Western Pacific, 2500 meters, the type.

Eastern Pacific in the Gulf of Panama, 2500, 2000 meters, two specimens.

The *Dana* took two larvae, one in the Pacific south of the Marquesas Islands and one in the Indian Ocean off South Africa.

Length.—5.7-51 mm.

Family CERATIIDAE

The numerous species assigned to this family have been reduced by Bertelsen (1951, p. 127) to two genera, each containing a single widespread species, neither of which belongs to the deep-abyssal fauna. The largest known ceratioid fish is a specimen of *Ceratias holboelli* 1200 mm. long (Bertelsen, 1951, p. 135). Parasitic males have been found on both species.

Ceratias holboelli Krøyer

Ceratias holboelli Krøyer, *1844, Naturh. Tidsskr., 1, (2), p. 638—off Greenland.

Ceratias holboelli Krøyer, *1844, in Gaimard, 1842-56, Voy. Comm. Sci. Nord., 2, pl. 9; Günther, 1861, Cat. Fishes Brit. Mus., 3: 205; 1887, Rep.

- Sci. Res. Voy. Challenger, Zool., 22: 53; Lütken, 1878, Dansk Vidensk. Selsk. Skr., (5), 11, (5), p. 326, figs. 2-8; Goode and Bean, 1895, Ocean. Ichth., p. 489, fig. 399; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2729; 1900, op. cit., fig. 954; Ehrenbaum, 1902, Fauna Arct., 2: 76; *1936, Naturg. Wirtsch. Bedeut. Seefische Nordeur., p. 164, fig. 137; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 578, fig. 12; Saemundsson, 1922, Vidensk. Medd. Dansk naturh. Foren., 74: 163, fig.; 1927, op. cit., 84: 168; 1932, Faune Ichth. Atl. Nord, 10, fig.; 1949, Zool. Iceland, 4, (72), p. 47 (further references, Iceland); Regan, 1925, Naturalist, p. 41, pl. 2; 1925, Proc. Roy. Soc. London, (B), 97: 387, pl. 20, text figs. 1-4; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 34, figs. 1, 20; Beebe, 1926, Bull. N. Y. Zool. Soc., 29: 79, figs.; 1938, op. cit., 41: 50, figs.; Regan and Trewavas, 1932, Dana Rep., 2: 12, 13, 42, figs. 1, 96; Schnakenbeck, *1936, Der Fischmarkt, (4), 7: 189, fig.; Rauther, * 1941, Zool. Anz., 136: 131, figs. 1-3; Barbour, 1942, Proc. New England Zool. Club, 21: 81; Bertelsen, 1943, Vidensk. Medd. Dansk naturh. Foren., 107: 185, figs. 1-4; 1951, Dana Rep., 39: 19, 128, 129, 133, pl., text figs. 4, 88, a, c, 89, b, d, e, 90-92; Clarke, 1950, Disc. Rep., 26: 9, pl. 1, text figs. 1-4; Bigelow and Schroeder, 1953, Fish. Bull., Fish Wildlife Serv., 53, (74), p. 543, fig. 288; Brandes, Kotthaus and Kreffit, 1954, Ann. Biol. Cons. Perm. Intern. Expl. Mer, 9: 47.
- Ceratiias uranoscopus* Murray, in Thomson, *1877, Voy. Challenger, p. 70, fig. 20; Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 54, pl. 11, fig. C.
- Mancaliias uranoscopus* Gill, 1878, Proc. U. S. Nat. Mus., 1: 228; Goode, 1880, op. cit., 3: 469; Goode and Bean, 1895, Ocean. Ichth., p. 490; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2729; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 37, fig. 21; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 30; 1932, Bull. Boston Soc. Nat. Hist., 63: 12, fig. 4; Norman, 1930, Disc. Rep., 2: 355; 1939, Sci. Rep. John Murray Exp. 1933-34, 7, (1), p. 116; Regan and Trewavas, 1932, Dana Rep., 2: 13, 99, fig. 158; Beebe, 1937, Zoologica, 22: 207; Barbour, 1942, Proc. New England Zool. Club, 21: 77, pl. 9; Imai, 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 43, figs. 4, 5; Beebe and Crane, 1947, Zoologica, 31: 169 (misspelled *Mancaliias*).
- Typhlopsaras shufeldti* Gill, 1883, Forest and Stream, p. 284; Barbour, 1942, Proc. New England Zool. Club, 21: 78, pl. 9.
- Ceratiias shufeldti* Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 54.
- Mancaliias shufeldti* Goode and Bean, 1895, Ocean. Ichth., p. 490, fig. 401; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2730; 1900, op. cit., fig. 955; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 579, fig. 14.
- Miopsaras myops* Gilbert, 1905, Bull. U. S. Fish Comm., 1903: 695, pl. 99; Fowler, 1928, Mem. Bishop Mus., 10: 475.
- Ceratiias n. sp.* Murray and Hjort, 1912, Depths of Ocean, pp. 81, 82, fig. 59.
- Mancaliias tentaculatus* Norman, 1930, Disc. Rep., 2: 355, fig. 45; Regan and Trewavas, 1932, Dana Rep., 2: 100.
- Mancaliias xenistius* Regan and Trewavas, 1932, op. cit., p. 99, pl. 6, fig. 2.

Mancalias bifilis Regan and Trewavas, 1932, op. cit., p. 100, pl. 6, fig. 1.

Mancalias uranoscopus triflos Roule and Angel, 1933, Rés. Camp. Sci. Monaco, 86: 57, pl. 3, fig. 27; Belloc, 1949, Bull. Inst. Océanogr. Monaco, 958: 17.

Mancalias sessilis Imai, 1941, Jap. Jour. Zool., 9: 245, figs. 12, 13; 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 45.

Typhloceratias firthi Barbour, 1942, Proc. New England Zool. Club, 21: 78, pls. 10, 11, fig. 2.

Parrichthys merrimani Barbour, 1942, op. cit., p. 84, pl. 11, fig. 1.

Ceratias holboelli xenistius Bertelsen, 1943, Vidensk. Medd. Dansk Naturh. Foren., 107: 203.

Ceratias holboelli sessilis Bertelsen, 1943, op. cit., p. 203.

Ceratias tentaculatus Bertelsen, 1943, op. cit., p. 203.

Reganichthys giganteus Bigelow and Barbour, 1944, Proc. New England Zool. Club, 23: 9, pls. 4-6.

Reganula gigantea Bigelow and Barbour, 1944, Copeia, p. 123.

Mancalias kroyeri Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 11, pl. 3, fig. 4.

Deep-abyssal records.—Eastern Atlantic, ca. 22° N., 22° W., 4390 meters, one specimen.

Western Atlantic, ca. 40° N., 56° W., 4000 meters, one specimen.

Western Atlantic, 17°-25° N., 60°-76° W., 2000-3000 meters, four specimens in three hauls.

Arabian Sea, 2091 meters, one specimen.

Indian Ocean, ca. 5° N., 80°-90° E., 2200, 2000 meters, two specimens.

Western Pacific, ca. 5° S., 130° E., 2000 meters, one specimen.

Distribution.—North Atlantic off Iceland and Greenland; from 38° N. to 4° N. in the east; and in the west from off Nova Scotia to Bermuda, the Caribbean, and off South America in ca. 7° N., 46° W. South Atlantic, ca. 7° S., 8° W. and ca. 52° S., 9° E. Indian Ocean off South Africa. North Indian Ocean from the Arabian Sea to ca. 9° S., 114° E. (off Java). Western Pacific off Japan, in the South China Sea and around the Dutch East Indies. Mid-Pacific off Hawaii. South Pacific off New Zealand and near New Caledonia. Eastern Pacific near Cocos Island, the Galapagos Islands, and in ca. 4° S., 116° W. Antarctic, ca. 61° S., 102° E.

There are about sixty-five specimens known, of which only ten have been reported from deep-abyssal waters. Large adult examples have all been found in relatively shallow water, some of them from an unknown depth, others in 120-680 meters. The only known Antarctic specimen was taken from the stomach of a sperm whale.

Smaller examples were caught between 200 and 1700 meters, one of them from a closing net hauled in 650–700 meters in the south Atlantic (ca. 52° S., 9° E.).

Larvae are known from the eastern, western, and southeastern Atlantic, the southern and western Pacific, and the north Indian Ocean.

Length.—3–1200 mm.

Remarks.—Free-living males were first described by Bertelsen (1951, p. 137), who also listed the seven known males parasitic on adult females whose length ranged between 850 and 1130 mm.

Cryptopsaras couesi Gill

Cryptopsaras couesii Gill, 1883, Forest and Stream, p. 284—Atlantic off coast of United States, ca. 38° N., 68° W., 3084 meters.

Cryptopsaras (*Cryptoparas* of authors) *couesii* Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 55; Goode and Bean, 1895, Ocean. Ichth., p. 491, fig. 402; Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., 47: 2731; 1900, op. cit., fig. 956; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 579, fig. 13; Roule, 1916, Bull. Inst. Océanogr. Monaco, 320: 27; 1919, Rés. Camp. Sci. Monaco, 52: 76, pl. 5, fig. 6; Regan, 1925, Proc. Roy. Soc. London, (B), 97: 393, fig. 5; 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 35, pl. 9, fig. 2; Barnard, 1927, Ann. So. Afr. Mus., 21: 1005; Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 29; 1930, Copeia, p. 135, fig. 8; Norman, 1930, Disc. Rep., 2: 354, fig. 44; Regan and Trewavas, 1932, Dana Rep., 2: 12, 96, fig. 154; Oshima, 1934, Rec. Oceanogr. Works Japan, 6: 108, fig.; Beebe, 1937, Zoologica, 22: 207; Kuronuma, 1941, Bull. Biogeogr. Soc. Japan, 11: 64; Barbour, 1941, Proc. New England Zool. Club, 19: 11, pl. 4, fig. 2, pl. 6, figs. 5, 6; Imai, 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 42, fig. 3; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 11; Smith, 1949, Sea Fishes So. Afr., p. 428, fig. 1229; Bertelsen, 1951, Dana Rep., 39: 14, 17, 22, 23, 128, 129, 139, 145, figs. 2, 3, 6, b, 7, 88, b, 89, a, c, 93–97; Abe and Nakamura, 1954, Jap. Jour. Ichth., 3: 95; Grey, 1955, Fieldiana, Zool., 37: 299.

Ceratiias carunculatus Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 55, pl. 11, fig. D.

Cryptopsaras carunculatus Goode and Bean, 1895, Ocean. Ichth., p. 491; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 36; Regan and Trewavas, 1932, Dana Rep., 2: 98, fig. 155; Norman, 1939, Sci. Rep. John Murray Exp. 1933–34, 7, (1), p. 115; Phillipps, 1941, Trans. Roy. Soc. New Zealand, 71: 160, pl. 27; Barbour, 1941, Proc. New England Zool. Club, 19: 11, pl. 3, fig. 2, pl. 6, figs. 7, 8.

Ceratiias couesii Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 317, pl. 15, fig. 7; 1908, op. cit., 15: (2), p. 184, pl. 32, fig. 17, pl. 34, fig. 17; Murray and Hjort, 1912, Depths of Ocean, pp. 92, 608, 614, 627, fig. 466; Saemundsson, 1922, Vidensk. Medd. Dansk naturh.

Foren., 74: 160, pl. 3; 1932, Faune Ichth. Atl. Nord, 10, fig.; 1949, Zool. Iceland, 4, (72), p. 47 (further references, Iceland); Borodin, 1931, Bull. Mus. Comp. Zool., 72: 83; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1137, fig. 477.

Ceratias (Paraceratias) mitsukurii Tanaka, 1908, Jour. Coll. Sci. Imp. Univ. Tokyo, 23, (13), p. 18, pl. 2, fig. 3.

Paraceratias mitsukurii Tanaka, 1911, Fig. Descr. Fishes Japan, 2: 30, pl. 8, fig. 25; Jordan, Tanaka, and Snyder, 1913, Jour. Coll. Sci. Imp. Univ. Tokyo, 33, (1), p. 427; Barbour, 1941, Copeia, p. 175.

Ceratias sp. Regan, 1916, Rep. Brit. Antarctic (Terra Nova) Exp. 1910, Zool., 1, (4), p. 147, pl. 10, fig. 1.

Cryptosaras mitsukurii Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 36; Regan and Trewavas, 1932, Dana Rep., 2: 98; Barbour, 1941, Proc. New England Zool. Club, 19: 7, 10, pl. 5.

Melanocetus sp. Beebe, 1926, Arcturus Adv., figs. 50, 53.

Cryptosaras valdiviae Regan and Trewavas, 1932, Dana Rep., 2: 98, fig. 156.

Cryptosaras pennifer Regan and Trewavas, 1932, op. cit., p. 98, fig. 157.

Cryptosaras normani Regan and Trewavas, 1932, op. cit., p. 98; Barbour, 1941, Proc. New England Zool. Club, 19: 11, pl. 4, fig. 1, pl. 6, figs. 1, 2; Imai, 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 39, figs. 1, 2; Beebe and Crane, 1947, Zoologica, 31: 168, fig. 14.

Cryptosaras Gregory, 1933, Trans. Amer. Phil. Soc., 23: 401, fig. 273.

Cryptosaras atlantidis Barbour, 1941, Proc. New England Zool. Club, 19: 11, pl. 3, pl. 6, figs. 3, 4.

Ceratias holboelli Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 4, (2), p. 10, pl. 2, fig. 2.

Cryptosaras couesii Fowler, 1949, Mem. Bishop Mus., 12: 160.

Deep-abyssal records.—Eastern Atlantic, ca. 36° N., 26° W., 3500 meters, one specimen.

Eastern Atlantic, ca. 39° N., 18° W. and ca. 21° N., 22° W., 2100, 2000 meters, two specimens.

Mid-Atlantic, ca. 28° N., 56° W., 4000 meters, one specimen.

Mid-Atlantic, ca. 28° N., 56° W. and ca. 31° N., 41° W., 2000-2500 meters, five specimens from two stations (three nets).

Western Atlantic, 3084 meters, the type.

Western Atlantic, 17°-34° N., 60°-70° W., 2000-2500 meters, five specimens from four hauls.

South Atlantic, ca. 23° S., 3° E. and ca. 35° S., 18° E., 2000-2500 meters, three specimens.

North Indian Ocean, ca. 1° N., 71° E. and ca. 5° N., 80° E., 2300-2500 meters, two specimens.

Arabian Sea and Gulf of Aden, 2091, 1840 meters, three specimens.

Western Pacific, 4°–5° S., 128°–130° E., 2000–2500 meters, two specimens.

Southwestern Pacific, ca. 33° S., 154°–165° E., 2000 meters, two specimens from two hauls.

South Pacific, ca. 14° and 18° S., 147°–163° E., 2000–2500 meters, three specimens from three hauls.

Eastern Pacific, ca. 0° 18' S., 99° W. and ca. 4° S., 116° W., 2000 meters, three specimens.

Distribution.—Atlantic, Iceland (one specimen) and from ca. 50° N. to ca. 7° N., 46° W. on the western side, and in the east, south to Cape Point, South Africa. Indian Ocean off South Africa. North Indian Ocean from the Gulf of Aden and the Arabian Sea south to ca. 7° S., 41° E. and east to ca. 9° S., 114° E. Western Pacific off Japan and around the Philippines and the Dutch East Indies. Southwestern Pacific off Australia and New Zealand (33°–35° S.) and in Cook Strait, New Zealand (ca. 42° S.). South Pacific near the Society Islands and Samoa. Eastern Pacific from the Gulf of Panama to ca. 4° S., 116° W. Larvae known from all areas inhabited by older examples.

Of about 150 known specimens only twenty-eight have been recorded from deep-abyssal waters, the rest from the surface to 1700 meters.

Length.—2.5–440 mm.

Remarks.—Two parasitic males recorded. Free-living males first described by Bertelsen (1951, p. 144).

Family GIGANTACTINIDAE

Bertelsen (1951, pp. 145–154, figs. 98–103) described the first known larvae belonging to the family Gigantactinidae. Those of the genus *Gigantactis* can be separated into two types but none can definitely be assigned to any of the described species, which are based on adult or adolescent female specimens. *Gigantactis* larvae were taken by the *Dana* in the north Atlantic, the western, southern and eastern Pacific, and the Indian Ocean. Bertelsen has noted that Beebe and Rose (1926, p. 49) figured a male *Gigantactis* larva.

Bertelsen also identified the first gigantactinid males. Those of the genus *Gigantactis* include *Teleotrema* Regan and Trewavas (see *G. microphthalmus*, below), *Teleotrema* sp. Nybelin (1948, p. 89) from the northwestern Atlantic, and five *Dana* specimens, one from the eastern Atlantic in 2500 meters and four from the Caribbean

Sea and western Atlantic in 1500–2000 meters. Like the larvae, males cannot be assigned to the described species, the taxonomy of which is most uncertain.

Also unassigned to any species is a metamorphosing female *Gigantactis* taken at a depth of 2500 meters in the Indian Ocean (Bertelsen, 1951, p. 150, fig. 99, *d*).

***Gigantactis macronema* Regan**

Gigantactis macronema Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Atlantic, ca. 31° N., 41° W.

Gigantactis macronema Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 38, pl. 11; Regan and Trewavas, 1932, Dana Rep., 2: 94; Bertelsen, 1951, op. cit., 39: 150, fig. 101.

Deep-abyssal record and distribution.—Mid-Atlantic, 3500 meters, type only.

Length.—133 mm.

***Gigantactis gracilicauda* Regan**

Gigantactis gracilicauda Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Caribbean Sea, ca. 13° N., 61° W.

Gigantactis gracilicauda Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 38, pl. 10, fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 94; Bertelsen, 1951, op. cit., 39: 150.

Deep-abyssal record and distribution.—Western Atlantic, 2700 meters, type only.

Length.—107 mm.

***Gigantactis sexfilis* Regan and Trewavas**

Gigantactis sexfilis Regan and Trewavas, 1932, Dana Rep., 2: 94, pl. 5, fig. 2, text fig. 150—Atlantic, ca. 13° N., 57° W.

Gigantactis vanhoeffeni Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 38 (part).

Gigantactis sexfilis Bertelsen, 1951, Dana Rep., 39: 150.

Deep-abyssal record and distribution.—Western Atlantic, 2500 meters, type only.

Length.—70 mm.

***Gigantactis vanhoeffeni* Brauer**

Gigantactis vanhoeffeni Brauer, 1902, Zool. Anz., 25: 296—Indian Ocean, ca. 5° S., 43° E.

Gigantactis vanhoeffeni Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 322, pl. 15, figs. 8, 9; 1908, op. cit., 15, (2), pp. 103, 184, pl. 31, figs. 18–20, pl. 32, figs. 1–5, pl. 34, fig. 14, pl. 44, fig. 1; Gill,

1908, Ann. Rep. Smithsonian Inst., p. 586, fig. 25; Regan and Trewavas, 1932, Dana Rep., 2: 93, 94; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1345, fig. 565; Bertelsen, 1951, Dana Rep., 39: 150.

Deep-abyssal records and distribution.—North Indian Ocean east of Zanzibar, 2500 meters, the type.

North Indian Ocean, ca. 6° S., 73° E., 1900 meters, one specimen.

Length.—30–35 mm.

Remarks.—A 30 mm. specimen from the Atlantic (ca. 25° N., 20° W., 3500 meters), listed as this species by Regan (1926, p. 38), was said by Bertelsen (1951, p. 150) to be a distinct species.

Gigantactis exodon Regan and Trewavas

Gigantactis exodon Regan and Trewavas, 1932, Dana Rep., 2: 94, pl. 5, fig. 1, text fig. 151—Caribbean Sea, ca. 18° N., 79° W.

Gigantactis vanhoeffeni Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 38 (part).

Gigantactis exodon Bertelsen, 1951, Dana Rep., 39: 150.

Distribution.—Western Atlantic, type only, 1700 meters.

Length.—32 mm.

Gigantactis perlatus Beebe and Crane

Gigantactis perlatus Beebe and Crane, 1947, Zoologica, 31: 167, pl. 2, fig. 3, text fig. 13—Pacific off Panama, ca. 7° N., 81° W.

Gigantactis perlatus Bertelsen, 1951, Dana Rep., 39: 150.

Distribution.—Eastern Pacific, type only, 914 meters.

Length.—42 mm.

Gigantactis ovifer Regan and Trewavas

Gigantactis ovifer Regan and Trewavas, 1932, Dana Rep., 2: 95, fig. 152—South China Sea, ca. 14° N., 119° E.

Gigantactis ovifer Bertelsen, 1951, op. cit., 39: 150.

Distribution.—Western Pacific, type only, 1700 meters.

Length.—39 mm.

Gigantactis filibulbosus Fraser-Brunner

Gigantactis filibulbosus Fraser-Brunner, 1935, Proc. Roy. Irish Acad., B42: 326—Atlantic, ca. 53° N., 12° W.

Gigantactis filibulbosus Bertelsen, 1951, Dana Rep., 39: 150.

Distribution.—Eastern Atlantic off southwestern Ireland, type only, 320 meters.

Length.—25 mm. (without caudal).

Gigantactis longicirra Waterman

Gigantactis longicirra Waterman, 1939, Bull. Mus. Comp. Zool., 85: 82, figs. 1, 2—Atlantic, ca. 39° N., 70° W.

Gigantactis longicirra Waterman, 1948, Jour. Morph., 82: 81, figs. 1-10; Bertelsen, 1951, Dana Rep., 39: 150.

Distribution.—Western Atlantic off the coast of the United States, type only, 1000 meters, taken in a closing net.

Length.—62 mm.

Gigantactis microphthalmus Regan and Trewavas

Teleotrema microphthalmus Regan and Trewavas, 1932, Dana Rep., 2: 93, fig. 149—Atlantic, ca. 8° N., 15° W.

Gigantactis microphthalmus Bertelsen, 1951, op. cit., 39: 152, figs. 102, b, 103, d-e.

Deep-abyssal records and distribution.—Eastern Atlantic, 3500 meters, the type.

Western Atlantic, ca. 17° N., 64° W., 2500 meters, one specimen.

Length.—20.5-22.5 mm.

Remarks.—Both specimens are males.

Rhynchactis leptonema Regan

Rhynchactis leptonema Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Atlantic, ca. 8° N., 44° W.

Rhynchactis leptonema Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 38, pl. 10, fig. 1; Regan and Trewavas, 1932, Dana Rep., 2: 95; Bertelsen, 1951, op. cit., 39: 154, fig. 104.

Deep-abyssal records and distribution.—Western Atlantic, 2000 meters, the type, a female.

South Pacific near Samoa, ca. 7° S., 167° W., 2500 meters, one male specimen.

Larvae were taken by the *Dana* in the western Atlantic and north Indian Oceans.

Length.—3-57 mm.

Family NEOCERATIIDAE

The family contains only one species, of which the male is known to be parasitic.

Neoceratias spinifer Pappenheim

Neoceratias spinifer Pappenheim, 1914, Deutsche Südpolar-Exp. 1901-1903, 15, Zool., 7: 198, fig. 10—Atlantic near St. Helena, ca. 12° S., 6° W.

Neoceratias spinifer Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 39, fig. 22; Regan and Trewavas, 1932, Dana Rep., 2: 95, fig. 153; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1146, fig. 484; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 9, pl. 2, fig. 5; Bertelsen, 1951, Dana Rep., 39: 158, figs. 105-107.

Deep-abyssal records.—Southeastern Atlantic, 2000 meters, the type.

Western Pacific, ca. 3° N., 137° E., 2500 meters, a female specimen with a parasitic male.

Distribution.—Mid- and southeastern Atlantic, one deep-abyssal record and one specimen in 1700 meters (ca. 34° N., 33° W.). Western Pacific, one deep-abyssal record.

The *Dana* took larvae in the north Atlantic, the north Indian Ocean and the western Pacific.

Length.—4-60 mm.

Family LINOPHRYNIDAE

Bertelsen (1951) divided linophrynyids into five genera and about nineteen species. He was unable to separate larvae of *Edriolychnus schmidti* from those of *Linophryne arborifera* and for all of these larvae he retained the name of "Hyaloceratias." Parasitic males have been found in four species and probably occur throughout the family.

Photocorynus spiniceps Regan

Photocorynus spiniceps Regan, 1925, Proc. Roy. Soc. London, (B), 97: 393, figs. 6, 7—Gulf of Panama, 1700 meters.

Photocorynus spiniceps Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 21, pl. 1, fig. 1, text fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 15, 102; Bertelsen, 1951, op. cit., 39: 163, 165, figs. 108, a, 109, 110.

Deep-abyssal records.—Gulf of Panama, 2200-2500 meters, four specimens from three hauls.

Distribution.—Eastern Pacific in the Gulf of Panama, four specimens from deep-abyssal hauls and the type, a female with a parasitic male, from 1700 meters.

Length.—11.5-62 mm.

Remarks.—Larvae unknown.

Edriolychnus schmidti Regan. Table 29.

Edriolychnus schmidti Regan, 1925, Proc. Roy. Soc. London, (B), 97: 398, figs. 8, 9—Caribbean Sea, ca. 13° N., 61° W., 2700 meters.

- Edriolychnus schmidti* Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 25, pl. 3, fig. 2, text fig. 5; Roule and Angel, 1930, Rés. Camp. Sci. Monaco, 79: 122, pl. 6, figs. 156-158; Regan and Trewavas, 1932, Dana Rep., 2: 15, 104, pl. 9, fig. 2, text figs. 3-5; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1342, fig. 562; Grey, 1955, Fieldiana, Zool., 37: 299.
- Edriolychnus* sp. Beebe, 1930, Bull. N. Y. Zool. Soc., 33: 205, 242, figs.; 1937, Zoologica, 22: 207; Regan and Trewavas, 1932, Dana Rep., 2: 104, fig. 163.
- Edriolychnus macracanthus* Regan and Trewavas, 1932, op. cit., p. 104.
- Edriolychnus radians* Regan and Trewavas, 1932, op. cit., pp. 17, 104, pl. 9, fig. 1, text fig. 64.
- Edriolychnus roulei* Regan and Trewavas, 1932, op. cit., p. 105.
- Edriolychnus schmidti* (?=*Haplophryne mollis*) Bertelsen, 1951, op. cit., 39: 163, 168, figs. 108, b, 111, a, b, 112, 113.

SYNONYMY OF MALES

- ?*Aceratias mollis* Brauer, 1902, Zool. Anz., 25: 297; 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 324, pl. 16, fig. 10.
- ?*Haplophryne mollis* Regan, 1912, Ann. Mag. Nat. Hist., (8), 9: 289; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 25 (part).
- Aceratias macrorhinus indicus* juvenes Murray and Hjort, 1912, Depths of Ocean, p. 745, fig. 536; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 15, pl. 2, figs. 3, 4.
- Haplophryne* sp. (?*Edriolychnus* male) Regan and Trewavas, 1932, Dana Rep., 2: 111 (part); ?Beebe, 1937, Zoologica, 22: 207 (part).

Distribution.—North Atlantic from ca. 35° N. to ca. 8° N., 44° W. in the west and to ca. 25° N., 20° W. in the east. South Atlantic, ca. 23° S., 3° E. Eastern Pacific, Gulf of Panama. South-western Pacific around New Caledonia, east of the Kermadec Islands (ca. 30° S., 176° W.) and near Lord Howe Island. Indian Ocean off Sumatra (ca. 6° S., 105° E.) and in ca. 26° S., 93° E.

The species is probably chiefly deep-abyssal. Of twenty-seven recorded specimens (thirty-two, including the five known parasitic males) only seven were caught above 2000 meters. All females with parasitic males have been taken at or below a depth of about 2000 meters. Extreme depth range 200-4000 meters.

Larvae are recorded as "*Hyaloceratias*" (p. 278).

Length.—17-63 mm.

***Linophryne algibarbata* Waterman**

- Linophryne algibarbata* Waterman, 1939, Bull. Mus. Comp. Zool., 85: 85, figs. 3, 4—Atlantic, ca. 39° N., 70° W., 400 meters.

Linophryne algibarbata Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 13, pl. 2, fig. 1; Bertelsen, 1951, Dana Rep., 39: 175.

SYNONYMY OF MALES

Aceratias macrorhinus Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 15 (part).

Distribution.—Western Atlantic only, the type in a closing net in 400 meters and two specimens in ca. 40° N., 50° W., 400–500 and 1100–1500 meters, respectively.

Length.—24–48 mm.

Remarks.—Larvae unknown.

Linophryne lucifer Collett

Linophryne lucifer Collett, 1886, Proc. Zool. Soc. London, p. 138, pl. 15—Atlantic, ca. 36° N., 20° W.

Linophryne lucifer Günther, 1887, Rep. Sci. Res. Voy. Challenger, Zool., 22: 57; Goode and Bean, 1895, Ocean Ichth., p. 496, fig. 408; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 584, fig. 23; Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 24; Regan and Trewavas, 1932, Dana Rep., 2: 106, 109 (spelled *lucifera*); Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1141, fig. 480; Bertelsen, 1951, Dana Rep., 39: 175, 176.

Distribution.—Eastern Atlantic off Madeira, the type only, found alive and helpless at the surface with a fish larger than itself in its stomach.

Length.—49 mm.

Remarks.—Males and larvae unknown.

Linophryne coronata Parr

Linophryne coronata Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 13, fig. 4—Atlantic off the Bahama Islands, 1609 meters.

Linophryne longibarbata Borodin, 1930, Proc. New England Zool. Club, 11: 87; 1931, Bull. Mus. Comp. Zool., 72: 83; Regan and Trewavas, 1932, Dana Rep., 2: 107.

Linophryne coronata Regan and Trewavas, 1932, op. cit., p. 110; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), pp. 44, 49, figs. 15, 16; Bertelsen, 1951, Dana Rep., 39: 175, 176.

Linophryne coronata longibarbata Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), pp. 45, 52, figs. 17, 18.

Linophryne coronata diplegma Parr, 1934, op. cit., pp. 7, 45, 49, 54, figs. 19, 20.

Distribution.—Western Atlantic only, ca. 25° N., 77° W. to ca. 37° N., 67° W., four specimens, 1050–1609 meters.

Length.—33–75 mm. (without caudal).

Remarks.—Males and larvae unknown; *L. masculina* (p. 277) may be the male.

Linophryne quinquerosus Beebe and Crane

Linophryne quinquerosus Beebe and Crane, 1947, *Zoologica*, **31**: 174, pl. 3, fig. 5, text fig. 17—Gulf of Panama.

Linophryne quinquerosus Bertelsen, 1951, *Dana Rep.*, **39**: 176.

Distribution.—Eastern Pacific, type only, 914 meters.

Length.—89 mm.

Remarks.—Males and larvae unknown.

Linophryne corymbifera Regan and Trewavas

Linophryne corymbifera Regan and Trewavas, 1932, *Dana Rep.*, **2**: 110, pl. 10, fig. 1, text figs. 69, 70—Celebes Sea.

Linophryne corymbifera Bertelsen, 1951, *op. cit.*, **39**: 177, fig. 116.

SYNONYMY OF MALES

Aceratias indicus Regan and Trewavas, 1932, *Dana Rep.*, **2**: 113 (part).

Deep-abyssal records.—Banda Sea, ca. 5° S., 130° E., 2500 meters, two young male specimens.

North Indian Ocean, ca. 1° N., 71° E., 2200 meters, one young male.

Distribution.—North Indian Ocean and western Pacific, three males from deep-abyssal waters and the type, a female, in 300–500 meters. Larvae known from the same areas.

Length.—10–48 mm.

Remarks.—Younger larvae of this species may be included in “*Hyaloceratias*” (p. 278).

Linophryne arborifera Regan. Table 30.

Linophryne arborifer Regan, 1925, *Ann. Mag. Nat. Hist.*, (9), **15**: 564—Atlantic, ca. 14° N., 28° W., 200–300 meters.

Linophryne arborifer Regan, 1926, *Oceanogr. Rep. Danish Dana Exp. 1920–22*, **2**: 24, pl. 3, fig. 1; Parr, 1927, *Bull. Bingham Oceanogr. Coll.*, **3**, (1), p. 10, fig. 3; Beebe, 1932, *Zoologica*, **13**: 90, fig. 24.

Haplophryne mollis Regan, 1926, *Oceanogr. Rep. Danish Dana Exp. 1920–22*, **2**: 25 (part), pl. 3, fig. 3.

Linophryne breviparvata Beebe, 1932, *Zoologica*, **13**: 94, figs. 26, 27; 1937, *op. cit.*, **22**: 207; Regan and Trewavas, 1932, *Dana Rep.*, **2**: 109; Parr, 1934, *Bull. Bingham Oceanogr. Coll.*, **4**, (6), p. 43.

- Cryptolychnus micractis* Regan and Trewavas, 1932, Dana Rep., 2: 45, 105.
- Linophryne arborifera* Regan and Trewavas, 1932, op. cit., pp. 105, 111; Beebe, 1932, Nat. Geogr. Mag., 61: 85; 1937, Zoologica, 22: 207; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 44; Bertelsen, 1951, Dana Rep., 39: 21, 168, 178, figs. 5, 111, c-d, 117, 118; Grey, 1955, Fieldiana, Zool., 37: 300.
- Linophryne eupogon* Regan and Trewavas, 1932, Dana Rep., 2: 110.
- Linophryne arborifera eupogon* Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), pp. 7, 44, 46, fig. 14.
- Linophryne densiramus* Imai, 1941, Jap. Jour. Zool., 9: 247, figs. 14-17; 1942, Jour. Dept. Agr. Kyusyu Imp. Univ., 7: 48.

SYNONYMY OF MALES

- Aceratias macrorhinus indicus* Brauer, 1902, Zool. Anz., 25: 297; 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 325, pl. 16, figs. 6-9; Murray and Hjort, 1912, Depths of Ocean, pp. 87, 90, 96, 609, 615, 627, figs. 68, 470; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 13 (part).
- Aceratias indicus* Gill, 1908, Ann. Rep. Smithsonian Inst., p. 587, figs. 27, 28; Regan, 1912, Ann. Mag. Nat. Hist., (8), 9: 289; 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 45, fig. 26; Regan and Trewavas, 1932, Dana Rep., 2: 113 (part).
- Lipactis tumidus* Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920-22, 2: 43 (part).
- Rhynchoceratias onchorhynchus* Regan, 1926, op. cit., p. 44 (part).
- ?*Haplophryne simus* Borodin, 1930, Occ. Pap. Boston Nat. Hist. Soc., 5: 285; 1931, Bull. Mus. Comp. Zool., 72: 83, pl. 4, fig. 1; Regan and Trewavas, 1932, Dana Rep., 2: 112.
- Nannoceratias denticulatus* Regan and Trewavas, 1932, op. cit., p. 112, fig. 172.
- Deep-abyssal records*.—Eastern Atlantic, ca. 25° N., 20° W., 4000 meters, one male specimen.
- Eastern Atlantic, ca. 33° N., 16° W. and ca. 7° S., 8° W., 3500 meters, two male specimens.
- Eastern Atlantic, ca. 29° N., 25° W. and ca. 36° N., 29° W., 2000 meters, two male specimens.
- Mid-Atlantic, ca. 31° N., 35° W., 2500 meters, one male specimen.
- Mid-Atlantic, ca. 28° N., 56° W., 2000 meters, two male specimens.
- Western Atlantic, ca. 25° N., 76° W., 2000 meters, one male specimen.
- Southwestern Pacific, ca. 33° S., 154°-165° E., 2200-2500 meters, three male specimens from three nets.

Western Pacific, ca. 4° S., 128° E., 2500 meters, one male specimen.

North Indian Ocean, ca. 6° S., 73° E., 1900 meters, two male specimens.

Distribution.—Eastern Atlantic from south of the Azores (ca. 36° N., 29° W.) to ca. 7° S., 8° W., five deep-abyssal specimens, two in 1000–1500 meters and two in 100–200 meters. Mid-Atlantic, three deep-abyssal specimens and one, ca. 34° N., 47° W., in 1700 meters. Western Atlantic from ca. 54° to ca. 25° N., one deep-abyssal record and twelve specimens in 500–1645 meters. Southwestern Pacific between Australia and New Zealand, deep-abyssal records only. Western Pacific in the Banda Sea (a deep-abyssal record), and off Japan, one specimen in 200–400 meters. North Indian Ocean near Chagos Archipelago and the Seychelles Islands, one deep-abyssal record and one specimen in 1500 meters. Males perhaps deep-abyssal. Deepest capture of a female, 1645 meters.

Length.—25–70 mm.

Remarks.—Larvae are included in “Hyaloceratias” (p. 278). Parasitic males have not yet been found.

Linophryne arcturi Beebe

Diabolidium arcturi Beebe, 1926, Bull. N. Y. Zool. Soc., 29: 80, fig.—Pacific, ca. 4° N., 87° W.

Diabolidium arcturi Beebe, 1926, Arcturus Adv., fig. 1.

Linophryne arcturi Regan and Trewavas, 1932, Dana Rep., 2: 107; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 42; Beebe and Crane, 1947, Zoologica, 31: 173, fig. 16; Bertelsen, 1951, Dana Rep., 39: 183.

Distribution.—Eastern Pacific south of Cocos Island, type only, 914 meters.

Length.—38.6 mm.

Remarks.—Males and larvae unknown.

Linophryne bicornis Parr

Linophryne bicornis Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 9, fig. 2—Atlantic off Bermuda, 1609 meters.

Linophryne bicornis Regan and Trewavas, 1932, Dana Rep., 2: 111; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 43; Bertelsen, 1951, Dana Rep., 39: 175, 184; Grey, 1955, Fieldiana, Zool., 37: 300, fig. 56.

Distribution.—Western Atlantic off Bermuda, two specimens, 1000–1609 meters.

Length.—27 mm. (without caudal) and 42 mm.

Remarks.—Males and larvae unknown.

Linophryne polypogon Regan

Linophryne polypogon Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 565—Atlantic, ca. 32° N., 16° W.

Linophryne polypogon Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 24, pl. 2, fig. 3; Regan and Trewavas, 1932, Dana Rep., 2: 108; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 43; Bertelsen, 1951, Dana Rep., 39: 183, figs. 120, a, 121, a.

Deep-abyssal record and distribution.—Eastern Atlantic, 3500 meters, type only.

Length.—45 mm.

Remarks.—Males and larvae probably included in the *L. macrorhinus* group (p. 277).

Linophryne macrodon Regan

Linophryne macrodon Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 564—Gulf of Panama.

Linophryne macrodon Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 24, pl. 2, fig. 2; Regan and Trewavas, 1932, Dana Rep., 2: 107; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 43; Bertelsen, 1951, Dana Rep., 39: 185, figs. 120, b, 121, c.

Deep-abyssal record and distribution.—Eastern Pacific, 2200 meters, type only.

Length.—53 mm.

Remarks.—Males and larvae probably included in the *L. macrorhinus* group (p. 277).

Linophryne brevibarbis Parr

Linophryne brevibarbis Parr, 1927, Bull. Bingham Oceanogr. Coll., 3, (1), p. 7, fig. 1—Atlantic off Bermuda.

Linophryne brevibarbis Regan and Trewavas, 1932, Dana Rep., 2: 108; Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 43; Bertelsen, 1951, Dana Rep., 39: 185.

Deep-abyssal record and distribution.—Western Atlantic, 2012 meters, type only.

Length.—34 mm.

Remarks.—Males and larvae probably included in the *L. macrorhinus* group (p. 277).

Linophryne racemifera Regan and Trewavas

Linophryne racemifera Regan and Trewavas, 1932, Dana Rep., 2: 108, pl. 10, fig. 2, text figs. 165, 166—Atlantic, ca. 24° N., 17° W.

Linophryne racemifera Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 43; Bertelsen, 1951, Dana Rep., 39: 185, fig. 121, b.

Deep-abyssal record and distribution.—Eastern Atlantic, 2500 meters, type only.

Length.—70 mm.

Remarks.—Males and larvae probably included in the *L. macrorhinus* group (see below).

Linophryne argyresca Regan and Trewavas

Linophryne argyresca Regan and Trewavas, 1932, Dana Rep., 2: 19, 108, pl. 10, fig. 3, text figs. 9, 167, 168—Indian Ocean, ca. 5° N., 90° E.

Linophryne argyresca Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), p. 44; Bertelsen, 1951, Dana Rep., 39: 185, fig. 121, e.

Deep-abyssal record and distribution.—North Indian Ocean, 2200 meters, a female with a parasitic male.

Length.—84 mm.

Remarks.—Larvae and free-living males perhaps included in the *L. macrorhinus* group (see below).

Linophryne masculina Parr

Borophryne masculina Parr, 1934, Bull. Bingham Oceanogr. Coll., 4, (6), pp. 7, 56, fig. 21—off the Bahama Islands.

Borophryne masculina Beebe and Crane, 1947, Zoologica, 31: 176.

Linophryne masculina Bertelsen, 1951, Dana Rep., 39: 186.

Distribution.—Western Atlantic, one male specimen, 1050–1100 meters.

Length.—24 mm.

Remarks.—Perhaps the male of *L. coronata*.

Linophryne macrorhinus group

Aceratias macrorhinus Brauer, 1902, Zool. Anz., 25: 296—Atlantic, ca. 9° S., 9° E., 2000 meters.

Aceratias macrorhinus Brauer, 1906, Wiss. Ergebn. Deutschen Tiefsee Exp. Valdivia, 15, (1), p. 324, pl. 16, figs. 4, 5; 1908, op. cit., 15, (2), p. 184, fig.; Gill, 1908, Ann. Rep. Smithsonian Inst., p. 587, fig. 26; Regan and Trewavas, 1932, Dana Rep., 2: 113; Koefoed, 1944, Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910, 4, (2), p. 15 (part), pl. 3, fig. 5.

Haplophryne hudsonius Beebe, 1929, *Zoologica*, **12**: 19; 1929, op. cit., p. 23, figs. 2-5; Parr, 1930, *Occ. Pap. Bingham Oceanogr. Coll.*, **3**: 14; Gregory, 1933, *Trans. Amer. Phil. Soc.*, **23**: 407, fig. 280.

Haplophryne mollis Norman, 1930, *Disc. Rep.*, **2**: 352.

Cryptolychnus paucidens Regan and Trewavas, 1932, *Dana Rep.*, **2**: 105, pl. 8, fig. 2.

Anomalophryne hudsonius Regan and Trewavas, 1932, op. cit., p. 112.

Aceratias edentula Beebe, 1932, *Zoologica*, **13**: 102, fig. 31; 1937, op. cit., **22**: 207.

Linophryne macrorhinus group Bertelsen, 1951, *Dana Rep.*, **39**: 184, 186, figs. 121, d, 122.

Distribution.—Eastern, western and southeastern Atlantic. Eastern, southern and western Pacific. North Indian Ocean.

Length.—3.5-30 mm.

Remarks.—In this group Bertelsen (1951) placed about fifty male and larval specimens not at present identified with any described species of *Linophryne*. The following species are perhaps represented in the group: *polypogon*, *macrodon*, *brevibarbis*, *racemifera*, *argyresca*(?).

“*Hyaloceratias*”

Haplophryne mollis Regan, 1916, *Brit. Antarctic (Terra Nova) Exp. 1910, Zool.*, **1**: 148, pl. 10, fig. 2.

Haplophryne sp. Regan and Trewavas, 1932, *Dana Rep.*, **2**: 111 (part), fig. 171.

Haplophryne triregium Whitley and Phillipps, 1939, *Trans. Roy. Soc. New Zealand*, **69**: 236.

Hyaloceratias parri Koefoed, 1944, *Rep. Sci. Res. M. Sars No. Atl. Deep-sea Exp. 1910*, **4**, (2), p. 16, pl. 1, figs. 7, 8.

“*Hyaloceratias*” Bertelsen, 1951, *Dana Rep.*, **39**: 168, 172, 189, figs. 123, 124.

Distribution.—North Atlantic. Eastern Pacific. South Pacific off New Zealand. Western Pacific. North Indian Ocean.

Length.—6-23 mm.

Remarks.—Under this name Bertelsen (1951) grouped 235 larval specimens belonging to *Edriolychnus schmidti*, *Linophryne arborifera* and possibly *L. corymbifera*.

Acentrophryne longidens Regan

Acentrophryne longidens Regan, 1926, *Oceanogr. Rep. Danish Dana Exp. 1920-22*, **2**: 23, pl. 1, fig. 2—Gulf of Panama, 1700 meters.

Acentrophryne longidens Regan and Trewavas, 1932, *Dana Rep.*, **2**: 106; Beebe and Crane, 1947, *Zoologica*, **31**: 170, fig. 15; Nigrelli, 1947, op. cit., p. 183, pls. 1-4, figs. 2-10; Bertelsen, 1951, *Dana Rep.*, **39**: 192.

Distribution.—Eastern Pacific in the Gulf of Panama and off Costa Rica, two specimens, 1700 and 914 meters.

Length.—60–75 mm.

Remarks.—Males and larvae unknown.

Borophryne apogon Regan. Table 31.

Borophryne apogon Regan, 1925, Ann. Mag. Nat. Hist., (9), 15: 564—Gulf of Panama, 2200 meters.

Borophryne apogon Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 23, pl. 2, fig. 1; Regan and Trewavas, 1932, Dana Rep., 2: 12, 18, 106, figs. 7, 8; Beebe and Crane, 1947, Zoologica, 31: 171, pl. 2, fig. 4; Bertelsen, 1951, Dana Rep., 39: 163, 193, figs. 108, d, 125, 126.

SYNONYMY OF MALES

Aceratius macrorhinus Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 45, fig. 27.

Distribution.—Eastern Pacific, Gulf of Panama and south of Cocos Island. Forty specimens known, including six parasitic males. Perhaps partially deep-abyssal in habitat. Four male larvae recorded from the Gulf of Panama. Extreme depth range 200–2700 meters.

Length.—7–83 mm.

Allector cheloniae Heller and Snodgrass

Allector cheloniae Heller and Snodgrass, 1903, Proc. Washington Acad. Sci., 5: 228, fig. 1—Galapagos Islands.

Allector cheloniae Regan, 1926, Oceanogr. Rep. Danish Dana Exp. 1920–22, 2: 25; Parr, 1930, Occ. Pap. Bingham Oceanogr. Coll., 3: 14; Regan and Trewavas, 1932, Dana Rep., 2: 103; Fowler, 1936, Bull. Amer. Mus. Nat. Hist., 70: 1368; Böhlke, 1953, Stanf. Ichth. Bull., 5: 148.

Distribution.—Eastern Pacific, one damaged specimen of uncertain taxonomic position, taken from the stomach of a green turtle.

Length.—27 mm.

TABLE 1.—Vertical Distribution of *Centroscymnus coelolepis*

Depth in meters.....	300-500	700-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	Total
No. of specimens												
East Atlantic.....	3	?common ¹	5	27	38	69	4	12	—	—	2	160+
Mediterranean.....	—	—	—	1	—	6	—	—	13	21	1	42
West Atlantic...."common"	—	1	2	—	—	—	—	—	—	—	—	3+

¹ Bragança (1904, p. 10) stated that he had never seen the species taken higher than 1200 meters off Portugal in spite of statements by various authors that it is common in about 1000 meters and is found as high as 370 meters.

TABLE 2.—Vertical Distribution of *Gonostoma bathyphilum*¹

Depth in meters.....	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	Total
Number of specimens.....	7	1	12	17	18	1 ²	1+1 ²	2	4+3 ²	3	
Depth in meters.....	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000+	5+10 ²	122+	
Number of specimens.....	1	—	—	—	35	1 ²	—	—	—	—	

¹ Not including five specimens reported by Beebe (1937) from Bermuda, in 1280-1829 meters.

² Number of hauls. Number of specimens not known. These hauls include twelve recorded by Zugmayer (1911) in 2320-5100 meters with a total of twenty-one specimens, and four by Goode and Bean (1895), who reported the species "in considerable numbers" in 1766 meters and between 1995 and 2258 meters.

TABLE 3.—Vertical Distribution of *Cyclothone livida*

Depth in meters	500	600- 799	800- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799	1800- 1999	2000- 2199	2200- 2399
	Hauls with counts									
Specimens	2 ¹	2	83	7	—	—	—	—	—	14
Hauls	1	1	3	1	—	—	—	—	—	1
Hauls without counts	—	—	—	—	—	1	—	—	5	1
Depth in meters	2400- 2599	2600- 2799	2800- 2999	3000- 3199	3200- 3399	3400- 3599	3600- 3799	3800- 3999	4000	Total
Hauls with counts									+	
Specimens	—	—	—	46	—	—	—	—	—	154
Hauls	—	—	—	4	—	—	—	—	—	11
Hauls without counts	2	1	—	1	—	1	—	—	2	14

¹ Young, 18-19 mm.

TABLE 4.—Vertical Distribution of Hauls Containing *Cyclothone microdon*

Depth in meters.....	Surface		200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599
	Number of hauls													
North Atlantic.....	2	2	2	3	3	3	6	4	4	2	1	1	2	1
East Atlantic.....	3	7	4	9	11	24	17	5	7	5	2	8	4	4
Mid-Atlantic.....	—	—	4	—	1	5	2	—	5	—	—	3	—	1
West Atlantic.....	1	—	7	5	5	10	7	3	3	2	1	5	—	2
South Africa.....	—	—	—	—	2	2	1	—	—	—	—	4	—	2
South Atlantic.....	—	—	—	2	1	5	1	—	2	—	1	3	1	2
West Pacific.....	—	2	2	1	1	2	—	5	5	—	3	3	2	4
North Indian.....	—	—	—	—	—	—	—	—	—	1	—	1	—	1
South Indian & South Pacific.....	—	—	1	—	1	1	3	—	—	1	1	4	1	1
Antarctic.....	—	—	—	—	—	2	1	3	3	—	2	—	—	—

Depth in meters...	2600-2799	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+	Total
	Number of hauls												
North Atlantic..	1	—	—	—	—	—	—	—	—	—	—	—	34
East Atlantic...	3	2	12	2	6	2	7	1	3	2	3	—	148
Mid-Atlantic....	—	—	2	1	1	—	1	—	—	1	—	1	28
West Atlantic...	—	1	—	—	—	—	1	—	—	—	1	—	51
South Africa....	—	—	1	—	—	—	—	—	—	—	—	—	12
South Atlantic..	1	—	3	—	1	—	—	—	—	1	—	—	24
West Pacific....	—	—	2	—	1	—	1	2	1	—	—	—	32
North Indian...	—	—	—	—	—	—	—	—	—	—	—	—	9
South Indian & South Pacific..	—	—	—	1	2	—	—	—	—	—	—	—	18
Antarctic.....	—	—	—	—	—	1	—	—	—	—	—	—	9

TABLE 4.—Vertical Distribution of Hauls Containing *Cyclothone microdon* (concluded)

Depth in meters.....	Surface																								
	399	400-399	599	600-599	799	800-799	899	900-899	1000-999	1199	1200-1199	1399	1400-1399	1599	1600-1599	1799	1800-1799	1999	2000-1999	2199	2200-2199	2399	2400-2399	2599	
% of total hauls																									
North Atlantic.....	5.9	5.9	5.9	8.8	8.8	8.8	8.8	17.7	11.8	11.8	11.8	11.8	11.8	5.9	5.9	2.9	2.9	2.9	2.9	2.9	5.9	5.9	5.9	2.9	
East Atlantic.....	2.0	4.7	2.7	6.0	7.4	16.1	11.4	11.4	4.7	3.3	3.3	1.3	1.3	5.3	5.3	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	
Mid-Atlantic.....	—	—	15.4	—	3.8	19.2	7.7	19.2	—	—	—	—	—	11.5	11.5	—	—	—	—	—	—	—	—	3.8	
West Atlantic.....	2.0	—	13.2	9.4	9.4	20.0	13.2	8.3	5.6	3.8	2.0	2.0	2.0	9.4	9.4	—	—	—	—	—	—	—	—	3.8	
South Africa.....	—	—	—	—	16.7	16.7	8.3	—	—	—	—	—	—	32.4	32.4	—	—	—	—	—	—	—	—	16.7	
South Atlantic.....	—	—	—	8.3	4.2	20.8	4.2	—	8.3	—	—	—	—	—	—	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	8.3	
West Pacific.....	—	6.2	6.2	3.1	3.1	6.2	—	—	15.6	—	—	—	—	—	—	9.4	9.4	9.4	9.4	9.4	9.4	6.2	6.2	12.5	
North Indian.....	—	—	33.3	—	22.2	—	—	—	—	—	—	—	11.1	—	—	—	—	—	—	—	—	—	—	11.1	
South Indian & South Pacific.....	—	—	5.5	—	5.5	5.5	16.7	—	—	5.5	—	—	—	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Antarctic.....	—	—	—	—	—	—	22.2	11.1	33.3	—	—	—	—	—	—	22.2	—	—	—	—	—	—	—	—	
Depth in meters.....	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+												
% of total hauls																									
North Atlantic.....	2.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
East Atlantic.....	2.0	1.3	8.0	1.3	4.0	1.3	—	—	4.7	.7	2.0	2.0	1.3	2.0	—	—	—	—	—	—	—	—	—	—	
Mid-Atlantic.....	—	—	7.7	3.8	3.8	—	—	—	3.8	—	—	—	3.8	—	—	—	—	—	—	—	—	—	—	3.8	
West Atlantic.....	—	2.0	—	—	—	—	—	—	2.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
South Africa.....	—	—	8.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
South Atlantic.....	4.2	—	12.5	—	4.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
West Pacific.....	—	—	6.2	—	3.1	—	—	—	3.1	6.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
North Indian.....	—	11.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
South Indian & South Pacific.....	—	—	—	5.5	11.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Antarctic.....	—	—	—	—	—	11.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

TABLE 5.—Vertical Distribution of *Cyclohone microdon* Estimated from Hauls for Which Specimen Counts Are Known

Depth in meters.....	Surface																Total	
	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599						
Number of hauls with specimen counts																		
North Atlantic.....	2	2	2	2	4	1	2	—	—	—	—	—	—	—	—	—	—	17
East Atlantic.....	3	2	9	11	16	17	4	5	1	5	3	1	—	—	—	—	—	115
Mid-Atlantic.....	—	—	3	1	1	1	2	—	—	1	—	—	—	—	—	—	—	13
West Atlantic.....	—	—	4	2	7	6	3	—	1	5	—	—	—	—	—	—	—	36
South Africa.....	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	4
South Atlantic.....	—	—	1	1	5	1	2	—	1	3	1	2	—	—	—	—	—	24
West Pacific & North Indian.....	—	2	3	1	2	—	5	—	3	3	2	4	—	—	—	—	—	33
South Pacific & South Indian.....	—	—	1	1	1	3	—	1	—	2	—	—	—	—	—	—	—	13
Antarctic.....	—	—	—	—	2	1	3	—	2	—	—	—	—	—	—	—	—	9
Depth in meters... 2600-2799	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 2800-2999	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 3000-3199	—	7	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 3200-3399	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 3400-3599	—	—	6	1	—	6	—	3	—	—	—	—	—	—	—	—	—	—
Depth in meters... 3600-3799	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 3800-3999	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 4000-4199	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 4200-4399	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 4400-4599	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 4600-4799	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 4800-4999	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Depth in meters... 5000+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Number of hauls with specimen counts																		
North Atlantic..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
East Atlantic...	2	2	6	1	—	6	—	3	—	—	—	—	—	—	—	—	—	—
Mid-Atlantic....	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
West Atlantic...	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
South Africa....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Atlantic..	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
West Pacific & North Indian.	—	—	1	—	—	1	2	1	—	—	—	—	—	—	—	—	—	—
South Pacific & South Indian.	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Antarctic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 5.—Vertical Distribution of *Cyclothone microdon* Estimated from Hauls for Which Specimen Counts Are Known (continued)

Depth in meters.....	Surface																Total
	399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599					
Number of specimens																	
North Atlantic.....	2	9	20	25	13	45	4	65	—	—	—	—	—	—	—	—	—
East Atlantic.....	5	2	106	34	33	42	75	163	31	5	55	3	1	—	—	—	—
Mid-Atlantic.....	—	—	248	—	121	448	357	332	—	—	1	—	—	—	—	—	—
West Atlantic.....	—	—	17	3	47	271 ¹	317	54	—	—	23 ¹	—	—	—	—	—	8 ¹
South Africa.....	—	—	—	—	1	44	—	—	—	—	23	—	—	—	—	—	—
South Atlantic.....	—	—	1	70	70	202	1	29	—	9	73	1	6 ¹	—	—	—	—
West Pacific & North Indian.....	—	3	5	1	6	5	—	16	—	8	11	6	21	—	—	—	—
South Pacific & South Indian.....	—	—	6	—	2	1	6 ¹	—	1	—	3 ¹	—	—	—	—	—	—
Antarctic.....	—	—	—	—	—	4	1	5	—	5	—	—	—	—	—	—	—
Depth in meters...	2600-2799	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+					
Number of specimens																	
North Atlantic..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	183
East Atlantic..	15	5	87 ¹	9	48 ¹	4	26	—	4 ¹	—	—	—	—	—	—	—	753+
Mid-Atlantic...	—	—	2	—	—	—	1	—	—	8	—	3	—	—	—	—	1519+
West Atlantic...	—	—	—	—	—	—	1	—	—	—	2	—	—	—	—	—	742+
South Africa...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	68
South Atlantic..	1	—	26	—	5	—	—	—	—	1	—	—	—	—	—	—	494+
West Pacific & North Indian.	—	—	16	—	8	—	2	3	1	—	—	—	—	—	—	—	112
South Pacific & South Indian.	—	—	—	2	1 ¹	—	—	1	—	—	—	—	—	—	—	—	22+
Antarctic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16

¹ One or two additional hauls with exact number of specimens unknown but listed as "numerous" or "several."

TABLE 5.—Vertical Distribution of *Cyclothone microdon* Estimated from Hauls for Which Specimen Counts Are Known (continued)

Depth in meters.....	Surface	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599
Range of specimens per haul													
North Atlantic.....	1	2-7	2-18	3-22	2-11	1-29	4	7-58	—	—	—	—	—
East Atlantic.....	1-2	1	1-29	1-11	1-10	1-7	1-19	1-129	1-16	5	1-34	1	1
Mid-Atlantic.....	—	—	7-214	—	121	448	357	166	—	—	—	—	—
West Atlantic.....	—	—	1-8	1-2	7-17	2-258	3-156	1-42	—	—	1-20	—	8
South Africa.....	—	—	—	—	1	19-25	—	—	—	—	23	—	—
South Atlantic.....	—	—	1	70	70	5-89	1	1-28	—	9	1-67	1	6
West Pacific & North Indian.....	—	1-2	1-3	1	6	2-3	—	1-7	—	1-5	1-7	2-4	1-14
South Pacific & South Indian.....	—	—	6	—	2	1	1-5	—	—	—	—	—	—
Antarctic.....	—	—	—	—	—	1-3	1	1-3	—	1-4	—	—	—
Depth in meters.....	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+
Range of specimens per haul													
North Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—
East Atlantic.....	3-12	1-4	2-44	4-5	3-24	4	—	1-11	—	2+	—	—	—
Mid-Atlantic.....	—	—	1	—	—	—	—	—	—	—	8	—	3
West Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	2	—
South Africa.....	—	—	—	—	—	—	—	—	—	—	—	—	—
South Atlantic.....	—	—	2-17	—	5	—	—	—	—	—	—	—	—
West Pacific & North Indian.....	—	—	6-10	—	8	—	—	2	1-2	1	—	—	—
South Pacific & South Indian.....	—	—	—	2	—	—	—	—	1	—	—	—	—
Antarctic.....	—	—	—	—	—	1	—	—	—	—	—	—	—

TABLE 5.—Vertical Distribution of *Cyclothone microdon* Estimated from Hauls for Which Specimen Counts Are Known (continued)

Depth in meters.....	Surface													
	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	2800-2999
Mean no. of specimens per haul	4.5	10.0	12.5	6.5	11.2	4.4	32.5	—	—	—	—	—	—	—
North Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
East Atlantic.....	1.7	11.8	3.8	3.0	2.6	4.4	41.0	6.2	—	11.0	—	—	—	—
Mid-Atlantic.....	—	82.7	—	—	—	—	—	—	—	—	—	—	—	—
West Atlantic.....	—	4.2	—	11.7	38.7	52.8	18.0	—	—	4.6	—	—	—	—
South Africa.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Atlantic.....	—	—	—	—	40.4	—	—	—	—	24.3	—	—	—	—
West Pacific & North Indian.....	—	1.7	—	—	—	—	3.2	—	2.7	3.7	—	—	—	5.2
South Pacific & South Indian.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Antarctic.....	—	—	—	—	—	—	1.7	—	—	—	—	—	—	—
Depth in meters.....	2600-2799	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+	—	—
Mean number of specimens per haul	7.5	2.5	12.4	4.5	8.0	—	4.3	—	—	—	—	—	—	—
North Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
East Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mid-Atlantic.....	7.5	2.5	12.4	4.5	8.0	—	4.3	—	—	—	—	—	—	—
West Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Africa.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—
West Pacific & North Indian.....	—	—	8.7	—	—	—	—	—	—	—	—	—	—	—
South Pacific & South Indian.....	—	—	8.0	—	—	—	—	—	—	—	—	—	—	—
Antarctic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 5.—Vertical Distribution of *Cyclothone microdon* Estimated from Hauls for Which Specimen Counts Are Known (concluded)

Depth in meters.....	Surface	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599
% of total number of specimens													
North Atlantic.....	1.1	4.9	10.9	13.6	7.1	24.6	2.2	35.3	—	—	—	—	—
East Atlantic.....	.7	.3	14.1	4.5	4.4	5.6	9.9	21.7	4.1	.7	7.3	.5	.1
Mid-Atlantic.....	—	—	16.3	—	7.9	29.5	23.5	21.8	—	—	—	—	—
West Atlantic.....	—	—	2.3	.4	6.2	36.5+	42.7	7.3	—	—	3.1+	—	1.1+
South Africa.....	—	—	—	—	—	64.8	—	—	—	—	33.8	—	—
South Atlantic.....	—	—	—	14.2	14.2	41.0	—	5.9	—	—	14.8	—	—
West Pacific & North Indian.....	—	2.7	1.8	.9	5.4	4.5	—	14.3	—	7.1	9.8	5.4	18.7
South Pacific & South Indian.....	—	—	27.3	—	9.1	4.5	27.3+	—	—	—	13.6+	—	—
Antarctic.....	—	—	—	—	—	25.0	6.2	31.3	—	31.3	—	—	—
Depth in meters.....	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+
% of total number of specimens													
North Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—
East Atlantic.....	2.0	.7	11.5+	1.2	6.4+	.5	—	3.5	—	.5+	—	—	—
Mid-Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—
West Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—
South Africa.....	—	—	—	—	—	—	—	—	—	—	—	—	—
South Atlantic.....	—	—	5.3	—	—	—	—	—	—	—	—	—	—
West Pacific and North Indian.....	—	—	14.3	—	7.1	—	—	1.8	2.7	.9	—	—	—
South Pacific & South Indian.....	—	—	—	9.1	4.5+	—	—	—	4.5	—	—	—	—
Antarctic.....	—	—	—	—	—	6.2	—	—	—	—	—	—	—

TABLE 6.—Vertical Distribution of *Cyclothone acclinidens*

Depth in meters.....	200-	400-	600-	800-	1000-	1200-	1400-	1600-	1800-	2000-	2200-
	399	599	799	999	1199	1399	1599	1799	1999	2199	2399
Number of hauls											
East Atlantic.....	—	1	—	1	—	1	2	—	—	3	—
South Atlantic.....	—	—	—	—	—	—	2	—	1	1	—
East Pacific.....	2	2	1	2	2	4	1	3	3	5	—
West Pacific.....	—	—	—	2	3	—	5	—	—	1	—
North Indian.....	—	—	—	3	3	3	8	—	1	11	—
South Indian.....	—	—	—	—	—	—	—	—	—	—	1
Depth in meters.....	2400-	2600-	2800-	3000-	3200-	3400-	3600-	3800-	4000	Total	
	2599	2799	2999	3199	3399	3599	3799	3999	+		
Number of hauls											
East Atlantic.....	2	—	—	4	—	2	—	—	—	16	
South Atlantic.....	1	—	—	2	—	—	—	—	—	7	
East Pacific.....	1	—	—	1	3	—	—	—	—	32	
West Pacific.....	—	—	—	2	—	—	—	—	—	13	
North Indian.....	6	—	—	—	—	—	—	—	—	35	
South Indian.....	—	—	—	—	—	—	—	—	—	1	

TABLE 7.—Vertical Distribution of *Eurypharynx pelecanoides* in the Atlantic Ocean

Depth in meters.....	700-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	2800-2999	3000-3199
Number of specimens												
East Atlantic.....	4	5	—	6	2	—	17	3	11	2	—	4
Mid-Atlantic.....	—	—	1	2	4	—	7	—	2	—	—	1
West Atlantic ¹	4 ²	6	5	10	5	3 ²	5	2	2	2 ²	—	—
Depth in meters.....	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	4800-4999	5000+	Total	
Number of specimens												
East Atlantic.....	—	21	1	2	7	—	—	2 ²	2 ²	2 ²	91+	
Mid-Atlantic.....	—	—	—	—	3	—	—	—	—	—	20	
West Atlantic.....	—	—	—	—	—	—	—	—	—	—	1	45+

¹ Omitted are eighty-four specimens caught off Bermuda between 914 and 1829 meters, precise data lacking (Beebe, 1937).

² Number of hauls only. Number of specimens not stated.

TABLE 8.—Vertical Distribution of *Synaphobranchus kaupii* in the Atlantic Ocean

Depth in meters.....	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999
Number of hauls without specimen counts.....	3	13	12	17	6	5	3	4	1
Number of hauls with specimen counts.....	—	5	3	11	7	17	13	7	3
Number of specimens.....	—	19	15	73	22	124	66	22	5
Range of specimens per haul.....	—	1-14	1-8	1-54	1-8	1-29	1-45	1-8	1-3
Mean number of specimens per haul.....	—	3.8	5.0	6.6	3.1	7.3	5.1	3.1	1.7
% of total specimens.....	—	4.7	3.7	18.0	5.4	30.5	16.3	5.4	1.2

Depth in meters.....	2000-2199	2200-2399	2400-2599	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	Total
Number of hauls without specimen counts.....	2	2	—	1	—	—	—	—	69
Number of hauls with specimen counts.....	7	5	—	—	—	—	1	1	80
Number of specimens.....	18	38	—	—	—	—	2	3	407
Range of specimens per haul.....	1-8	1-24	—	—	—	—	2	3	
Mean number of specimens per haul.....	2.7	7.6	—	—	—	—	—	—	
% of total specimens.....	3.9	9.4	—	—	—	—	—	—	

TABLE 9.—Vertical Distribution of *Serrinomer parabeani* in the Atlantic Ocean

Depth in meters.....	300-1000	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	Total
Number of hauls.....	?	6	5	5	4	15	3	10	59
Number of specimens.....	6	5	5	5	4	15	3	10	59

TABLE 10.—Vertical Distribution of *Serrivomer sector*¹

Depth in meters.....	200- 599	600- 799	800- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799	1800- 1999
Number of hauls								
Indian Ocean.....	—	—	—	—	2	—	1	—
Pacific Ocean.....	2	—	1	3	2	3	7	1
Number of specimens								
Indian Ocean.....	—	—	—	—	2	—	1	—
Pacific Ocean.....	2?	—	1	3	2?	13+?	19	1?
Depth in meters.....	2000- 2199	2200- 2399	2400- 2599	2600- 2799	2800- 2999	3000- 3199	3200- 3399	Total
Number of hauls								
Indian Ocean.....	1	1	1	—	—	—	—	6
Pacific Ocean.....	6	6	—	1	—	2	1	35
Number of specimens								
Indian Ocean.....	1	1	1	—	—	—	—	6
Pacific Ocean.....	6?	23+?	—	1?	—	3+?	1?	75+

¹? signifies that the number of specimens per haul is not always known. In these instances one specimen has been added to the totals.

TABLE 11.—Vertical Distribution of *Arocettina infans*

Depth in meters.....	600-799		800-999		1000-1199		1200-1399		1400-1599		1600-1799		1800-1999		2000-2199		2200-2399		Total	
Number of specimens																				
East Atlantic ¹	1	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mid-Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
West Atlantic ²	1	3	—	—	—	2	1	1	1	1	—	—	—	—	—	—	—	—	—	
South Africa.....	—	—	←? →	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
South Atlantic.....	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
North Indian.....	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	
West Pacific.....	—	1	—	—	—	—	—	—	1	—	1	1	1	—	—	—	—	—	—	
Depth in meters.....	2400-2599		2600-2799		2800-2999		3000-3199		3200-3399		3400-3599		3600-3799		3800-3999		4000+		Total	
Number of specimens																				
East Atlantic.....	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	9	
Mid-Atlantic.....	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	
West Atlantic.....	2	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	
South Africa.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	?	
South Atlantic.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	
North Indian.....	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	4	
West Pacific.....	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	

¹ Also a specimen on the Welsh coast, data not available.

² Also a young specimen from the stomach of a *Parathunnus* taken at Bermuda.

TABLE 12.—Vertical Distribution of *Cyema atrum*

Depth in meters	800-	1000-	1200-	1400-	1600-	1800-	2000-	2200-	2400-
	999	1199	1399	1599	1799	1999	2199	2399	2599
Number of specimens									
East Atlantic ¹	—	—	—	1	1	—	4	2	—
Mid-Atlantic	—	—	—	—	—	—	1	1	1
West Atlantic ²	—	—	1	—	—	—	—	—	—
East Pacific	—	—	—	1	—	—	—	—	—
South Pacific	—	—	—	—	—	—	—	—	—
North Indian	1	—	—	—	—	—	1	1	—
South Indian	—	—	—	—	—	—	—	—	—
Depth in meters	2600-	2800-	3000-	3200-	3400-	3600-	3800-	4000	Total
	2799	2999	3199	3399	3599	3799	3999	+	
Number of specimens									
East Atlantic	—	—	2	—	5	5	—	7	27
Mid-Atlantic	—	—	—	—	4	—	—	1	8
West Atlantic	—	—	1	—	—	—	—	—	3
East Pacific	—	—	—	—	—	—	—	—	1
South Pacific	1	—	—	—	2	—	—	—	3
North Indian	1	—	—	—	—	—	—	—	4
South Indian	—	—	—	1	—	—	—	—	1

¹ Also one from unknown depth.

² Also, in 1463-1829 meters, four specimens, some of which may be larvae.

TABLE 13.—Vertical Distribution of *Aldronandia affinis*

Depth in meters.....	800—		1200—		1400—		1600—		1800—		2000—		2400—		Total
	999	1199	1399	1599	1799	1999	2199	2399	2599	2799	2999	3199	3399	3599	
Number of hauls															
South Africa.....	1	3	1	—	—	—	—	—	—	1	1	—	—	1	8
North Indian.....	—	1	1	—	1	—	—	—	—	2	—	—	—	—	5
West Pacific.....	2	1	—	—	—	—	—	—	—	—	—	—	—	—	3
Number of specimens															
South Africa.....	1	4	1	—	—	—	—	—	—	2	8	—	—	3	19
North Indian.....	—	1	1?	—	1	—	—	—	—	4	—	—	—	—	7?
West Pacific.....	2	2	—	—	—	—	—	—	—	—	—	—	—	—	4

TABLE 14.—Vertical Distribution of *Aldronandia macrochir*

Depth in meters.....	1000—		1400—		1800—		2000—		2200—		2400—		2600—		2800—		3000—		Total
	1199	1399	1599	1799	1999	2199	2399	2599	2799	2999	3199	3399	3599	3799	3999	4199	4399		
Number of hauls																			
East and Mid-Atlantic.....	1	1	—	2	5	2	—	—	—	3	—	—	—	2	1	—	—	1	18
West Atlantic.....	1	—	1	3	1	3	4	—	—	4	3	—	—	3	—	—	—	1	20
South Africa and South Indian..	—	—	—	2	—	—	—	—	—	—	2	—	—	—	—	—	—	—	6
Number of specimens																			
East and Mid-Atlantic.....	1	2	—	4	9	18	12	—	—	9	1	—	—	1	—	—	—	1	57
West Atlantic ¹	5	—	1?	3?	1?	22+?	4?	5+?	—	3?	—	—	—	—	—	—	—	1	45+
South Africa and South Indian..	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9

¹All records from *Albatross*, *Fish Hawk*, and *Blake* stations; number of specimens rarely stated. ?=one or more hauls with number of specimens unknown. One example per haul has been added to the totals in these cases.

TABLE 15.—Vertical Distribution of *Anitimora rostrata*¹

Depth in meters.....	400- 599	600- 799	800- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799
Number of hauls							
North Atlantic.....	2	3	15	6	10	10	6
South Atlantic.....	—	—	—	1	—	—	—
South Africa and South Indian Ocean.....	—	—	—	4	1	—	—
Pacific Ocean.....	1	3	7	1	2	—	2
Number of specimens							
North Atlantic.....	2?	4+?	29+?	6?	36+?	10?	20+?
South Atlantic.....	—	—	—	1	—	—	—
South Africa and South Indian Ocean.....	—	—	—	224	8	—	—
Pacific Ocean.....	1?	3?	7?	1	2?	—	2?
Depth in meters.....	1800- 1999	2000- 2199	2200- 2399	2400- 2599	2600- 2799	2800- 2999	Total
Number of hauls							
North Atlantic.....	3	1	5	3	2	—	66
South Atlantic.....	—	—	—	—	—	—	1
South Africa and South Indian Ocean.....	1	1	—	2	—	—	9
Pacific Ocean.....	2	—	1	—	—	1	20
Number of specimens							
North Atlantic.....	18+?	1	11+?	3?	2?	—	142+
South Atlantic.....	—	—	—	—	—	—	1
South Africa and South Indian Ocean.....	1	13	—	6	—	—	252
Pacific Ocean.....	2	—	1	—	—	1?	20+

¹? = one or more hauls with number of specimens unknown. In these instances one example per haul is included in the totals.

TABLE 16.—Vertical Distribution of *Nematonurus armatus* in Deep-Abyssal Waters¹

Depth in meters...	2200-2399	2400-2599	2600-2799	2800-2999	3000-3199	3200-3399	3400-3599	3600-3799	3800-3999	4000-4199	4200-4399	4400-4599	4600-4799	Total
Number of hauls														
East Atlantic...	1	—	3	—	1	—	—	1	—	1	3	—	1	11
Mid-Atlantic...	—	—	—	—	1	—	—	—	—	—	—	1	—	2
West Atlantic...	4	1	3	1	1	—	—	1	—	—	—	—	—	11
South Atlantic...	—	—	—	—	—	—	1	—	—	—	—	—	—	1
South Indian...	—	1	—	1	—	1	1	—	—	—	—	—	—	4
Pacific.....	—	—	—	—	—	1	1	1	—	—	—	1	—	4
Number of specimens														
East Atlantic...	1?	—	10	—	3	—	—	1	—	1	4	—	1	21
Mid-Atlantic...	—	—	—	—	7	—	—	—	—	—	—	1	—	8
West Atlantic...	8+?	1?	3?	1?	1?	—	—	1	—	—	—	—	—	15+
South Atlantic...	—	—	—	—	—	—	2	—	—	—	—	—	—	2
South Indian...	—	6	—	3	—	11	1	—	—	—	—	—	—	21
Pacific.....	—	—	—	—	—	1	1	3	—	—	—	1	—	6

¹?=one or more hauls in which the number of specimens is not known. In these instances one example per haul has been added to the totals.

TABLE 17.—Vertical Distribution of *Chalinura carapina*

Depth in meters.....	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	2800-2999	3000-3199	Total
Number of hauls											
Eastern and Mid-Atlantic...	—	—	1	—	—	—	—	—	—	1	6
West Atlantic ¹	2	5 ²	3	7	3	6 ³	3	2 ⁴	—	—	31

¹ Omitted from the table are seven specimens taken in four hauls, 2012-2423 meters.

² One haul contained nine specimens.

³ One haul contained four specimens.

⁴ One haul contained six specimens.

TABLE 18.—Vertical Distribution of *Chalinura guentheri*

	1200- 1399	1400- 1599	1600- 1799	1800- 1999	2000- 2199	2200- 2399	2400- 2599	2600- 2799	Total
Depth in meters.....	2	1	2	7	3	1	—	1	17
Number of hauls.....	2	1	31	75	10	2	—	1	122

TABLE 19.—Vertical Distribution of *Nezumia sclerorhynchus*
in the eastern Atlantic

	470- 599	600- 799	800- 999	1000- 1199	1200- 1399	1400- 1599	
Depth in meters.....	7	8	12	7	8	5	
Number of hauls.....	23	30	123	81	38	27	
Number of specimens.....							
Depth in meters.....	1600- 1799	1800- 1999	2000- 2199	2200- 2399	2400- 2599	2600- 2799	
Number of hauls.....	—	2	2	5	—	1	
Number of specimens.....	—	2	2	12	—	1	
Depth in meters.....	2800- 2999	3000- 3199	3200- 3399	3400- 3599	3600- 3799	Total	
Number of hauls.....	—	—	1	—	1	59	
Number of specimens.....	—	—	3	—	3	345	

TABLE 20.—Vertical Distribution of *Melamphaes nigrescens*

	1098	1800	1900	ca. 2000	2200- 2500	3000- 4000	Total
Depth in meters.....	1	3	1	18	3	2	28
Number of hauls.....	1	3	1	18	3	2	28

TABLE 21.—Vertical Distribution of *Lycodes frigidus*

Depth in meters.....	800- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799	1800- 1999	2000- 2199	2200- 2399	2400- 2599	2600- 2799	Total
Number of hauls.....	3	3	4	3	3	4	4	2	1	1	28
Number of specimens.....	"many", 2+	12 young	13	30	30	28	10	7	3	1	106+

TABLE 22.—Vertical Distribution of *Lycodes atlanticus*

Depth in meters.....	900- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799	1800- 1999	2000- 2199	2200- 2399	2400- 2599	2600- 2599	Total
Number of hauls.....	2	—	1	6	4	4	3	—	1	1	21

TABLE 23.—Vertical Distribution of *Lycodonus mirabilis*

Depth in meters.....	800- 999	1000- 1199	1200- 1399	1400- 1599	1600- 1799	1800- 1999	2000- 2199	2200- 2399	Total
Number of hauls.....	1	1	2	2	4	6	1	1	18

TABLE 24.—Vertical Distribution of *Rhodichthys regina*

Depth in meters.....	1200-	1400-	1600-	1800-	2000-	2200-	Total
	1399	1599	1799	1999	2199	2399	
Number of hauls.....	3	3	4	4	1	2	17
Number of specimens.....	12 + ?	3?	12 + ?	4?	1	2	34 +

TABLE 25.—Vertical Distribution of *Melanocetus murrayi*

Depth in meters.....	1000-	1500-	2000-	2500-	3000-	3500-	Total
	1499	1999	2499	2999	3499	3999	
Number of specimens							
Eastern and Mid-Atlantic.....	—	3	1	—	1	2	3
West Atlantic ¹	18	4 ²	6	8	2	1	39
Pacific.....	—	—	—	—	—	3	3

¹Omitted are fifteen specimens taken off Bermuda between 1098 and 1829 meters, exact depth data not known.

²Including a specimen taken by the U. S. Fish and Wildlife Service vessel *Oregon* in the Gulf of Mexico at Station 841, 28° 58' N., 88° W., 830-930 fathoms, October 6, 1953.

TABLE 26.—Vertical Distribution of *Melanocetus johnsoni*

Depth in meters.....	100-1000-		1500-1999		2000-2499		2500-2999		3000-3499		3500-3999		4000-4499		4500-5000		Total
	999	1499	1999	2499	2999	3499	3999	4499	4999	5499	5999	6499	6999	7499	7999	8499	
Number of specimens																	
North Atlantic.....	11	3	6	2	2	5	—	7	1	—	—	—	—	—	—	—	37
South Atlantic.....	10	3	1	2	1	—	—	—	—	—	—	—	—	—	—	—	17
North Indian.....	1	—	—	5	1	1	—	—	—	—	—	—	—	—	—	—	8
West Pacific.....	2	—	2	9	—	—	—	—	—	—	—	—	—	—	—	—	13
South Pacific.....	—	—	—	2	1	—	—	1	—	—	—	—	—	—	—	—	4
East Pacific.....	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1

TABLE 27.—Vertical Distribution of the *Oncirodes eschrichti* Group

Depth in meters.....	300-750-		800-999		1000-1499		1500-1999		2000-2499		2500-2999		3000-3499		3500-3999		Total
	750	1499	1999	2499	2999	3499	3999	4499	4999	5499	5999	6499	6999	7499	7999	8499	
Number of specimens																	
North Atlantic.....	4	2	1	2	1	2	6	3	—	—	—	—	—	—	—	—	20
South Atlantic.....	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
North Indian.....	—	2	—	1	—	—	—	1	—	—	—	—	—	—	—	—	4
West Pacific.....	1	1	—	—	—	—	2	2	—	—	—	—	—	—	—	—	6
East Pacific.....	1	1	—	3	—	4	—	—	—	—	—	—	—	—	—	—	9

TABLE 28.—Vertical Distribution of *Microlophichthys microlophus*

Depth in meters.....	900-1000	1500-1800	2000-4000	Total
Number of specimens				
East Atlantic.....	—	—	2	2
West Atlantic.....	2	—	2	4
East Pacific.....	2	4	5	11
West Pacific.....	—	1	2	3
North Indian.....	—	—	1	1

TABLE 29.—Vertical Distribution of *Edriolychnus schmidti*

Depth in meters.....	200-300		1000-1500		2000-2500		3000-3500		Total
	300	1499	1999	2499	2999	3499	3999		
Number of specimens									
North Atlantic.....	—	5	1	2	3 ¹	—	4	3	18
South Atlantic.....	—	—	—	1 ¹	—	—	—	—	1
North Indian.....	—	—	—	1	—	—	—	—	1
South Indian.....	1	—	—	—	—	—	—	—	1
West Pacific.....	—	—	—	1	4 ²	—	—	—	5
East Pacific.....	—	—	—	—	1	—	—	—	1

¹ One specimen with a parasitic male.

² One of these specimens carried three parasitic males.

TABLE 30.—Vertical Distribution of *Linophryne arborifera*

Depth in meters.....	100-500	1000-1500	1500-1700	1900-2000	2200-2500	3500-4000	Total
Number of specimens							
Females.....	5	7	2	—	—	—	14
Males.....	—	2	4	7	5	3	21

TABLE 31.—Vertical Distribution of *Borophryne apogon*

Depth in meters.....	200-300	800-999	1000-1499	1500-1999	2000-2499	2500-3000	Total
Number of specimens							
Females.....	1 ¹	2 ¹	1	—	3+1 ¹	2 ¹	10
Free-living males.....	—	1	—	1	11	7	20

¹ Females with parasitic males attached.

BENTHIC FISHES FOUND BELOW A DEPTH OF 2000 METERS
OR 1000 FATHOMS

Names followed by an asterisk are those of species found also below 3660 meters (2000 fathoms).

Names followed by a dagger are those of species probably occurring normally in deep-abyssal waters.

Key to Symbols Used for Showing Geographic Distribution

AR	Arctic	EP	Eastern Pacific	SWP	Southwestern Pacific
EA	Eastern Atlantic	NP	North Pacific	SMP	South mid-Pacific
M	Mediterranean	MP	Mid-Pacific	SEP	Southeastern Pacific
MA	Mid-Atlantic	WP	Western Pacific	SA	South Atlantic
SAf	South Africa	NI	North Indian	AN	Antarctic
WA	Western Atlantic	SI	South Indian		

Name	Distribution	Depth in meters
Scylliorhinidae		
<i>Apristurus indicus</i> Brauer.....	EA, NI	1225-1840
Squalidae		
<i>Etmopterus princeps</i> Collett.....	EA, WA	567-2055
<i>Centrophorus squamosus</i> Bonnaterre.....	EA	400-1875
<i>Centroscymnus coelolepis</i> Bocage and Capello†....	EA, M, WA	330-2718
Rajidae		
<i>Raja hyperborea</i> Collett.....	AR	183-2394
<i>jenseni</i> Bigelow and Schroeder.....	WA	366-2296
<i>fyllae</i> Lütken.....	AR, EA, WA	274-2055
<i>bathypbila</i> Holt and Byrne.....	EA, WA	676-2173
<i>microtrachys</i> Osburn and Nichols.....	EP	1994
<i>badia</i> Garman.....	EP	2323
<i>abyssicola</i> Gilbert.....	EP	2904
Chimaeridae		
<i>Hydrolagus affinis</i> Capello.....	EA, WA	293-2360
<i>purpurescens</i> Gilbert.....	MP	1750-1951
Rhinochimaeridae		
<i>Harriotta raleighana</i> Goode and Bean.....	EA, WA	530-2603
Alepocephalidae		
<i>Alepocephalus rostratus</i> Risso*.....	EA, M, ?WA	300-3655
<i>agassizi</i> Goode and Bean†.....	EA, WA	984-2286
<i>productus</i> Gill.....	EA, WA	2055-2491
<i>fundulus</i> Garman.....	EP	2322-3057
<i>australis</i> Barnard.....	?EA, SAf	1153-2603

Name	Distribution	Depth in meters
<i>atlanticus</i> Roule and Angel ¹	EA	4000
<i>Talismania bifurcata</i> Parr ¹	EP	?2200
<i>Rinocles nasutus</i> Koefoed*.....	EA, WA	2865-3886
<i>Bathytrocles alveatus</i> Garman.....	EP	2068-2415
<i>macrolepis</i> Günther*.....	WP, ?NI	3932
<i>inspector</i> Garman.....	EP	2690
<i>alvifrons</i> Garman.....	EP	2488-3279
<i>koefoedi</i> Parr.....	EA	2865
<i>michaelsarsi</i> Koefoed.....	EA	2865
<i>Bajacalifornia drakei</i> Beebe ¹	WA	732-1645, ?2012
<i>Grimatrocles grimaldii</i> Zugmayer ¹	EA	4900
<i>microlepis</i> Günther.....	EA, ?NI	1992, ?914
<i>Narctes pappenheimi</i> Fowler.....	WP	1997
<i>stomias</i> Gilbert.....	EP	1604-1968
<i>pluriserialis</i> Garman.....	EP	1847
<i>affinis</i> Lloyd.....	NI	1839
<i>Bellocia vaillanti</i> Parr.....	EA	2600
<i>Leptochilichthys macrops</i> Roule and Angel ¹	EA	3000
<i>agassizi</i> Garman.....	EP	2877
<i>Rouleina atritus</i> Vaillant*†.....	EA	1442-3655
<i>danae</i> Parr ¹	WP	?2500
<i>guentheri</i> Alcock.....	NI	786-2140
<i>Asquamiceps velaris</i> Zugmayer ¹	EA	3660
<i>indagatio</i> Parr ¹	SAf	2580
<i>pacificus</i> Parr ¹	EP	2200
<i>Brunichthys asperifrons</i> Garman.....	EP	1430-1865
<i>Leptoderma macrops</i> Vaillant.....	EA	800-2330
<i>Aulastomatomorpha phosphorops</i> Alcock.....	NI	1829-2012
<i>caeruleiceps</i> Lloyd.....	NI	1839
<i>Conocara weneri</i> Nybelin.....	EA	2150-2300
<i>macroptera</i> Vaillant†.....	EA, WA	865-2115
<i>murrayi</i> Koefoed.....	EA, WA	2055-2603
<i>Ericara salmonea</i> Gill and Townsend*.....	EP, NP	2469-3991
<i>niger</i> Günther.....	WP	2560
<i>Einara macrolepis</i> Koefoed ¹	EA	4000
Searsiidae		
<i>Mirorictus taningi</i> Parr ¹	EP	?2200
<i>Platytrrocles apus</i> Günther.....	EA, MA, NI	1353-2744 ?4900
<i>Holtbyrnia melanocephalus</i> Vaillant.....	EA, ?WA	1617-3205
<i>Searsia polycoeca</i> Parr ¹	EA, WA	?-2012
<i>Pellisolus facilis</i> Parr ¹	EP	?2300
<i>Barbantus curvifrons</i> Roule and Angel ¹	EA	4500
Bathylaconidae		
<i>Bathylaco nigricans</i> Goode and Bean*.....	WA, EP	2200-4370

¹ Perhaps pelagic.

Name	Distribution	Depth in meters
Harpadontidae		
<i>Bathysaurus ferox</i> Günther†.....	EA, MA, Saf, WA, SWP	1098-3120
<i>mollis</i> Günther*†.....	EA, EP, WP, SMP	2615-4361
Chlorophthalmidae		
<i>Bathysauropsis gracilis</i> Günther†.....	Saf, SWP, SEP, SA	869-2606
Bathypteroidae		
<i>Benthosaurus grallator</i> Goode and Bean†.....	EA, WA	2104-3384
<i>Bathypterois dubius</i> Vaillant.....	EA, M	800-1940
<i>phenax</i> Parr.....	WA	1645-2194
<i>antennatus</i> Gilbert.....	MP, WP	258-2403
<i>pectoralis</i> Garman.....	EP	1619-2070
<i>longipes</i> Günther*.....	EA, WA, SA	827-4846
<i>filiferus</i> Gilchrist.....	Saf	1098-2561
<i>insularum</i> Alcock.....	NI	2084
<i>capensis</i> Gilchrist and von Bonde.....	Saf	2231
Ipnopidae		
<i>Bathymicrops regis</i> Hjort and Koefoed*†.....	EA, WA	4255-5300
<i>sewelli</i> Norman*.....	NI	3840-3872
<i>Ipnops murrayi</i> Günther*†.....	Saf, WA, WP, NI, SA	1463-3932
<i>agassizi</i> Garman.....	EP	2488
<i>pristibrachium</i> Fowler.....	WP	1393-1992
Simenchelyidae		
<i>Simenchelys parasiticus</i> Gill.....	EA, Saf, WA, WP	366-2620
Nettastomidae		
<i>Venefica proboscidea</i> Vaillant.....	EA, Saf, NI	1207-2200
<i>ocella</i> Garman.....	EP	1951
<i>procera</i> Goode and Bean.....	WA, WP	326-2194
Congridae		
<i>Promyllantor purpureus</i> Alcock.....	NI	1829
Ilyophidae		
<i>Ilyophis brunneus</i> Gilbert.....	EA, Saf, WA, EP	1159-2615
Synphobranchidae		
<i>Synphobranchus infernalis</i> Gill†.....	EA, MA, WA	644-3166
<i>bathybius</i> Günther*†.....	NP, MP, WP, NI	2926-3749

Name	Distribution	Depth in meters
<i>australis</i> Regan.....	SI, SA	2515-3185
<i>kaupi</i> Johnson†.....	EA, SAF, WA	236-3200 ?3465
<i>brevidorsalis</i> Günther.....	WP, NI	693-1956

Halosauridae

<i>Halosaurus johnsonianus</i> Vaillant.....	EA	834-2115
<i>attenuatus</i> Garman.....	EP	2488 ?1180
<i>Aldrovandia rostrata</i> Günther*.....	EA, MA, ?WA	1311-5029
<i>affinis</i> Günther†.....	SAf, WP, NI	883-2560
<i>gracilis</i> Goode and Bean.....	WA	1380-2615
<i>pallida</i> Goode and Bean.....	WA	1241-2615
<i>macrochir</i> Günther†.....	EA, MA, SAF, WA, SI	1163-3166
<i>phalacra</i> Vaillant†.....	EA, NI	1103-2320

Notacanthidae

<i>Macdonaldia</i> sp. Koefoed.....	EA	2615
<i>challengeri</i> Vaillant.....	NP, WP	2971-3429
<i>africana</i> Gilchrist and von Bonde.....	SAf	2231
<i>Polyacanthonotus vaillanti</i> Fowler.....	EA, WA	1995-2212
<i>altus</i> Gill and Townsend.....	NP	2562

Moridae

<i>Lepidion lepidion</i> Risso.....	EA, M, WA	540-2230
<i>Antimora rostrata</i> Günther†.....	EA, SAF, WA, EP, NP, MP, WP, SWP, SI, SA	403-2904
<i>Laemonema melanurum</i> Goode and Bean.....	EA, WA	380-2683

Gadidae

<i>Gaidropsarus ensis</i> Reinhardt.....	WA	360-2022
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Macrouridae

<i>Bathygadus melanobranchus</i> Vaillant.....	EA, SAF	830-2560
<i>favosus</i> Goode and Bean.....	?EA, WA	768-2745
<i>Gadomus longifilis</i> Goode and Bean.....	EA, WA	631-2165
<i>Nematonurus cyclolepis</i> Gilbert.....	EP	2904
<i>leccointei</i> Dollo.....	SA, AN	2800-3246
<i>suborbitalis</i> Gill and Townsend.....	NP	3239
<i>lepturus</i> Gill and Townsend.....	NP	2065-2562
<i>abyssorum</i> Gilbert*.....	EP	2469-3991
<i>armatus</i> Hector*†.....	EA, MA, WA, MP, SWP, SI, SA	282-4700
<i>Coryphaenoides rupestris</i> Gunnerus.....	EA, WA	155-2276
<i>Chalinura murrayi</i> Günther†.....	EA, SWP	1207-3000
<i>mediterranea</i> Giglioli.....	M	2805-2904

Name	Distribution	Depth in meters
<i>fernandeziana</i> Günther.....	SEP	2515
<i>filifera</i> Gilbert.....	EP	2904
<i>liocephala</i> Günther*.....	MP, WP	3429-3749
<i>simula</i> Goode and Bean*†.....	EA, MA, WA	1669-4600 (?610-1183)
<i>carapina</i> Goode and Bean*†.....	EA, MA, WA	1211-5300
<i>ferrieri</i> Regan.....	AN	2579-3109
<i>whitsoni</i> Regan.....	SA, AN	604-3185
<i>guentheri</i> Vaillant†.....	EA, ?NI	1200-2603
<i>serrula</i> Bean.....	NP	2869
<i>brevibarbis</i> Goode and Bean*†.....	EA, MA, WA	1748-4700
<i>Macrourus paradoxus</i> Smith and Radcliffe.....	WP	2021
<i>bucephalus</i> Garman.....	EP	245-2877
<i>carminifer</i> Garman.....	EP	588-1865
<i>anguliceps</i> Garman†.....	EP	1271-2417
<i>longicirrhus</i> Gilbert.....	MP	1829-2403
<i>aequatoris</i> Smith and Radcliffe.....	WP	1992-1997
<i>cinereus</i> Gilbert.....	NP	630-1890
<i>altipinnis</i> Günther.....	WP	1034-3429
<i>ingolfi</i> Lütken.....	EA	1545-2378
<i>sublaevis</i> Vaillant.....	EA	?
<i>hexti</i> Alcock.....	NI	1582-1829
<i>wood-masoni</i> Alcock.....	NI	693-1840
<i>hoskyni</i> Alcock.....	NI	2395
<i>camurus</i> Smith and Radcliffe.....	WP	2021
<i>orthogrammus</i> Smith and Radcliffe.....	WP	2308
<i>asper</i> Günther.....	WP	3429
<i>albatrossus</i> Townsend and Nichols.....	EP	1968
<i>Hemimacrus acrolepis</i> Bean†.....	EP, NP, WP	155-2226 (?2469)
<i>Grenurus hirundo</i> Collett.....	EA	1266-2300
<i>flagellicauda</i> Koefoed.....	EA, MA	2150-3120
<i>Oxygadus labiatus</i> Koehler.....	EA	460-2220
<i>Hymenocephalus italicus</i> Giglioli.....	EA, M	400-4900
<i>Lionurus filicauda</i> Günther*†.....	SI, SEP, SA	2515-4846
<i>liolepis</i> Gilbert.....	EP	294-2012
<i>fragilis</i> Garman.....	EP	3057-3333
<i>Nezumia convergens</i> Garman.....	EP	1271-1865
<i>bairdi</i> Goode and Bean.....	?EA, WA	0-2295
<i>aequalis</i> Günther.....	EA, M, WA	200-2320
<i>sclerorhynchus</i> Valenciennes*†.....	EA, M	500-3655
<i>parvipes</i> Smith and Radcliffe†.....	WP	1992-2308
<i>Cetonurus globiceps</i> Vaillant*.....	EA, WA	1139-4621
<i>Echinomacrus mollis</i> Roule*.....	EA	5000-5413
Stephanoberycidae		
<i>Stephanoberyx monae</i> Gill.....	WA	979-2295
<i>Acanthochaenus luetkeni</i> Gill*†.....	EA, WA	2211-5393
<i>Malacosarcus macrostoma</i> Günther*.....	MP	4298-4435

Name	Distribution	Depth in meters
Acropomatidae		
<i>Brephostoma carpenteri</i> Alcock.....	NI	2505-2780
Parapercidae		
<i>Macrius amissus</i> Gill and Townsend.....	SEP	1920
Bathydraconidae		
<i>Bathyraco antarcticus</i> Günther.....	AN	2304
<i>scotiae</i> Dollo.....	AN	2260-2579
Zoarcidae		
<i>Lycodes frigidus</i> Collett†.....	AR, SAF	631-2750 (?2880-3000)
<i>atlanticus</i> Jensen†.....	WA	944-2603
<i>platyrhinus</i> Jensen.....	AR	1847
<i>cicatrifer</i> Garman.....	EP	3057
<i>Lycenchelys jordani</i> Evermann and Goldsborough.....	NP	1687-1945
<i>antarcticus</i> Regan.....	AN	3246
<i>albus</i> Vaillant*.....	EA	3975
<i>Lycodonus ophidium</i> Jensen.....	EA	1992
<i>mirabilis</i> Goode and Bean†.....	WA	850-2394
<i>flagellicauda</i> Jensen.....	AR	839-1835
<i>Maynea bulbiceps</i> Garman.....	EP	2690
<i>conorhynchus</i> Garman.....	EP	3279
<i>Bothrocaropsis elongata</i> Garman.....	EP	1271-1865
<i>Melanostigma pammelas</i> Gilbert.....	EP	97-2012
<i>atlanticum</i> Koefoed.....	EA, SAF, WA	723-1853 (?2561)
<i>Pachycara obesa</i> Zugmayer*.....	EA	4780
Lycodapodidae		
<i>Lycodapus fierasfer</i> Gilbert.....	EP, NP	111-1968
Derepodichthyidae		
<i>Derepodichthys alepidotus</i> Gilbert.....	NP	2904
Brotulidae		
<i>Monomeropus malispinosus</i> Garman.....	EP	1865
<i>Dicrolene filamentosa</i> Garman.....	EP	935-1865
<i>nigra</i> Garman.....	EP	769-1865
<i>Barathrodemus manatinus</i> Goode and Bean.....	WA	1183-2552
<i>nasutus</i> Smith and Radcliffe.....	WP	1992-1997
<i>Barathrites iris</i> Zugmayer.....	MA, WA	1645-3465
<i>abyssorum</i> Roule*.....	EA	5285
<i>Bassogigas crassus</i> Vaillant*†.....	EA, MA	1797-4255
<i>pterotus</i> Alcock.....	NI	1829-3197
<i>aequatoris</i> Smith and Radcliffe.....	WP	1992
<i>digittatus</i> Garman*†.....	EP	2196-4082

Name	Distribution	Depth in meters
<i>koefoedi</i> Nybelin.....	EA	2603
<i>brucei</i> Dollo*.....	AN	4571
<i>grandis</i> Günther.....	WP	3465
<i>gilli</i> Goode and Bean.....	WA	2022
<i>Alcockia rostrata</i> Günther*.....	WP	3932
<i>Bassozetus normalis</i> Gill†.....	WA	2068-3512
<i>oncrocephalus</i> Vaillant.....	EA	3200
<i>taenia</i> Günther*†.....	MA, WA	4571-5610
<i>nasus</i> Garman.....	EP	3057-3436
<i>compressus</i> Günther.....	MA, WP	1920-2744
<i>elongatus</i> Smith and Radcliffe.....	WP	1992
<i>glutinosus</i> Alcock†.....	NI	1163-2395
<i>Eretmichthys pinnatus</i> Garman.....	EP	1789-2417
<i>ocella</i> Garman.....	EP	2322
<i>remifer</i> Smith and Radcliffe.....	WP	1997
<i>Porogadus miles</i> Goode and Bean.....	SAf, WA	1280-2194
<i>nudus</i> Vaillant.....	EA	2324-3200
<i>catena</i> Goode and Bean.....	WA	2683
<i>gracilis</i> Günther.....	WP	2560
<i>trichiurus</i> Alcock†.....	NI	1336-2312
<i>melanocephalus</i> Alcock.....	NI	3006-3197
<i>subarmatus</i> Vaillant†.....	EA, WA	2104-3200
<i>longiceps</i> Garman.....	EP	245, 1865-3279
<i>atripectus</i> Garman.....	EP	1412-2322
<i>promelas</i> Gilbert.....	EP	1180-1968
<i>Penopus macdonaldi</i> Goode and Bean.....	WA	2982
<i>Penopus(?) microphthalmus</i> Vaillant.....	EA	3200
<i>Mixonus laticeps</i> Günther*.....	EA, MA, ?WA	2615-4571
<i>caudalis</i> Garman†.....	EP, NI	1524-2417
<i>pectoralis</i> Goode and Bean.....	WA	604, 2615
<i>Mastigopterus praetor</i> Smith and Radcliffe.....	WP	2361
<i>Grimaldichthys squamosus</i> Roule*.....	EA	4621
<i>profundissimus</i> Roule*.....	MA, WA	5600-6035
<i>Leucicorus lusciosus</i> Garman.....	EP	3436
<i>Enchelybrotula paucidens</i> Smith and Radcliffe....	WP	1992
<i>Acanthonus armatus</i> Günther†.....	EA, WP	1920-2603
<i>spinifer</i> Garman.....	EP	3240
<i>Tauredophidium hexti</i> Alcock.....	NI	2395
<i>Typhlonus nasus</i> Günther*†.....	WP	3932-4461
<i>Cataetyx simus</i> Garman.....	EP	2322-2690
<i>Diplacanthopoma brunnea</i> Smith and Radcliffe....	WP, NI	685-1893
<i>Aphyonus gelatinosus</i> Günther.....	WP	2560
<i>Sciadonus pedicellaris</i> Garman.....	EP	1847
<i>Barathronus affinis</i> Brauer.....	NI	2919
<i>parfaiti</i> Vaillant.....	EA	1846, 5005
<i>Leucochlamys cryptophthalmus</i> Zugmayer*.....	EA	5000

Name	Distribution	Depth in meters
Cottidae		
<i>Zesticelus profundorum</i> Gilbert.....	EP, NP	730-1980
Cottunculidae		
<i>Cottunculoides spinosus</i> Gilchrist.....	SAf	1463-2176
Liparidae		
<i>Rhodichthys regina</i> Collett†.....	AR	1150-2365
<i>Careproctus bathycoetus</i> Gilbert and Burke.....	NP	3291
<i>longifilis</i> Garman.....	EP	3333
<i>ovigerum</i> Gilbert.....	EP	2904
<i>opisthotremus</i> Gilbert and Burke.....	NP	1914
<i>Paraliparis fimbriatus</i> Garman.....	EP	3240
<i>ulochir</i> Gilbert.....	EP, NP	743-1838
<i>bathybi</i> Collett.....	AR	670-2000
<i>latifrons</i> Garman.....	EP	3279
<i>holomelas</i> Gilbert.....	NP	128-3350
<i>copei</i> Goode and Bean.....	EA, SAf, WA	548-1829
<i>grandiceps</i> Garman.....	EP	2904
<i>Acantholiparis opercularis</i> Gilbert and Burke.....	NP	1248-3608
Chaunacidae		
<i>Chaunax roseus</i> Barbour.....	WA	1956
Ogocephalidae		
<i>Malthopsis spinosa</i> Garman.....	EP	1865-2322
<i>Halieutopsis tumifrons</i> Garman.....	EP	2417-2488
<i>Dibranchius nasutus</i> Alcock.....	WP, NI	343-1886
<i>nudiventer</i> Lloyd.....	NI	1789-2012
<i>hystrix</i> Garman.....	EP	1153-2322
<i>obscurus</i> Brauer.....	NI	1022-1840

BATHYPELAGIC FISHES FOUND BELOW A DEPTH OF
2000 METERS OR 1000 FATHOMS

Gonostomatidae		
<i>Gonostoma bathyphilum</i> Vaillant†.....	EA, MA, WA, SAf	650-5100
<i>Cyclothone livida</i> Brauer†.....	EA, SA	500-4972
<i>microdon</i> Günther.....	EA, M, MA, SAf, WA, EP, NP, WP, MP, NI, SI, SWP, SMP, SA, AN	0-5000
<i>acclinidens</i> Garman†.....	EA, MA, SAf, ?WA, EP, MP, WP, NI, SA	224-4417
<i>obscura</i> Brauer†.....	EA, SAf, NI	800-5248

Name	Distribution	Depth in meters
Eurypharyngidae		
<i>Eurypharynx pelecyanoides</i> Vaillant †.....	EA, MA, WA, EP, MP, WP, NI, SWP	549-7625
Serrivomeridae		
<i>Serrivomer parabeani</i> Bertin †.....	EA, MA, WA	300-4500
<i>sector</i> Garman †.....	EP, MP, NI, SI	245-3240
Nemichthyidae		
<i>Avocellina infans</i> Günther †.....	EA, MA, SAf, WA, WP, NI, SA	600-4571
Cyemidae		
<i>Cyema atrum</i> Günther †.....	EA, MA, SAf, WA, EP, SEP, SWP, NI, SI, SA	800-5100
Melamphaidae		
<i>Melamphaes nigrescens</i> Brauer †.....	EA, MA, SAf, WA, EP, WP, NI, SI	1098-4000
Triacanthodidae		
<i>Atrophacanthus danae</i> Fraser-Brunner †.....	WP	300-3500
Melanocetidae		
<i>Melanocetus murrayi</i> Günther †.....	EA, MA, WA, EP, WP, SWP	1050-4480
<i>Melanocetus johnsoni</i> Günther †.....	EA, MA, SAf, WA, NI, WP, SWP, EP	0-4789
Oneirodidae		
<i>Microlophichthys microlophus</i> Regan †.....	EA, WA, EP, WP, NI	914-4000
Linophryniidae		
<i>Edriolychnus schmidti</i> Regan †.....	EA, MA, WA, SA, EP, SWP, NI	200-4000
<i>Borophryne apogon</i> Regan †.....	EP	200-2700

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ADDENDUM

After this paper had gone to press a few additional species from Oregon Station 1303 were received, including the three listed below (see p. 93). Data are as follows: Gulf of Mexico, 28° 47' N., 87° 50' W., May 26, 1955, 2104–2194 meters.

Aldrovandia gracilis Goode and Bean. Twenty-one specimens, total length 267–536 mm. (see p. 154).

Aldrovandia pallida Goode and Bean. Twenty specimens, total length 307.5–512 mm. (see p. 154).

Chalinura murrayi Günther. One specimen, total length 730 mm. Not known previously from the western Atlantic (see p. 170). The specimen is a male, larger than any other recorded example, and has a decidedly hump-backed appearance.

It should also be noted that I have received, too late for inclusion, a paper by Nybelin (1954, Union Int. Sci. Biol., (B), 16: 65–71), in which are reported twenty specimens of *Bathypterois longipes* (see p. 133) caught by the Swedish Deep-sea Expedition (1947–1948) at four localities in the north Atlantic, in depths between 4200 and 5600 meters.

I have found that the depth of capture given for the type of *Benthosaurus grillator* (p. 131) is perhaps an error. Data for this specimen were given originally as follows: Blake station CLXXIV, in Lat. 24° 33' N., Long. 84° 23' W., at a depth of 1850 fathoms. Sanderson Smith (1888, p. 967) listed Blake station 174 in the Caribbean Sea off Guadeloupe Island, depth 878 fathoms. In the Gulf of Mexico, with the latitude and longitude noted above, Smith (op. cit., p. 963) listed only one station (Agassiz 31), and the depth was said to be 1920 fathoms. If the type of *B. grillator* actually came from a depth of 1920 fathoms its lower limit would then be extended from 3384 to 3512 meters.

Manuscript completed February 8, 1956.

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